FREE DISC

CREATE YOUR OWN DESKTOP GADGETS & MINI APPS, TUNE UP & OPTIMISE YOUR PC **+ MAKE WINDOWS BOOT FASTER WITH THESE FULL-VERSION PROGRAMS**

apc+

Dec 2014
Issue 409

YOUR EXPERT GUIDE TO TODAY'S TECH

WINDOWS 10 REVEALED!

CAN MICROSOFT FIX ITS WINDOWS 8 DISASTER & TRULY MAKE ONE OS TO RULE ALL YOUR DEVICES?

A CHROMEBOOK FOR CHRISTMAS?

AVE GOOGLE'S BUDGET LAPTOPS & DESKTOPS FINALLY COME OF AGE? PLUS: HOW TO INSTALL LINUX ON ONE!

08 RATED

ENTHUSIAST X99 'BOARDS ON TEST

BUILD A BLISTERING RIG WITH INTEL'S LATEST HIGH-PERFORMANCE KIT

THE REAL THREATS REVEALED

(IN PLAIN ENGLISH)

12 SECURITY SUITES COMPARED
SHIELD YOUR ANDROID
MAC & iOS SECURITY SECRETS

TAKE BACK YOUR PRIVACY & SECURITY

RAMP UP YOUR DIGITAL DEFENCES WITH OUR COMPLETE GUIDE TO ONLINE SECURITY, PRIVACY & ANONYMITY

12
13006 001416
Future
STRALIA $9.95 • NEW ZEALAND $10.90 INC GST
NT POST APPROVED: 100000179 • ISSN: 0728-4415

HOLIDAY HOW-TOs!

GUARD YOUR HOME THIS SUMMER WITH A RASPBERRY PI **BUILD A LINUX PHOTO SERVER TO SHARE SNAPS** SHARE YOUR FLICKS WITH FAMILY VIA iTUNES **USE AN OLD iOS DEVICE AS A SECURITY CAM**

HOT NEW GEAR

MASSIVE 34-INCH LG MONITOR
AFFORDABLE WINDOWS 8 2-IN-1
ASUS's ENTHUSIAST 802.11AC ADSL ROUTER **AMD'S OFFICIAL SSD**

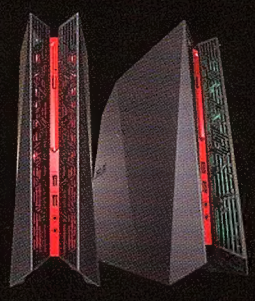
REPUBLIC OF GAMERS

THE CHOICE OF CHAMPIONS

ASUS recommends Windows.

ROG G20 COMPACT GAMING DESKTOP PC

DECEPTIVELY POWERFUL



The World's Most Powerful Compact Gaming Desktop PC

Space-saving and compact size with up to a 4th-gen Intel® Core™ i7 processor gives you unprecedented levels of gaming and multitasking performance

Ready for Marathon Gaming Sessions

Effective heat management for ultimate stability
Ultra-quiet: 25dB at idle
Eco Energy Mode: draws just 10W at idle

Optimsed Utilities Designed for Gamers

Customisable lighting effects showcases up to 8 million colours
ASUS-exclusive Aegis application provides a gamer-themed interface to monitor system performance

intel inside™ CORE™ i7

ASUS desktops - Most recommended Windows desktop brand
Based on 2014 Readers' Choice*

*Reprint from www.pcmag.com with permission ©2014 Ziff Davis, Inc. All Rights Reserved.
** Intel, the Intel Logo, Intel Inside, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and/or other countries.

ASUS® IN SEARCH OF INCREDIBLE

apc

Future Publishing Australia,
PO Box 1077, Mount Street, North Sydney, NSW 2059
Tel: 02 9955 2677 Fax: 02 9955 2688
SUBSCRIPTION ENQUIRIES: Please call Magshop 13 61 16
Email: apcmag@futurenet.com
Web: www.apcmag.com

EDITORIAL
Editor-in-Chief **Dan Gardiner**
Managing Editor **Melanie Pike**
Features/Disc Editor **Peter Dockrill**

ART/PRODUCTION
Creative Director **Troy Coleman**
Senior Designer **Nykke Coleman**
Designer **Sharnee Brisbourne**

CONTRIBUTORS
Cory Banks, Graham Barlow, Neil Bothwick, Helen Bradley, Luke Dormehl, Dan Grabham, Craig Grannell, Lindsay Handmer, Tim Hardwick, Lou Hattersley, Christian Hall, Phil Iwaniuk, Dave James, Andy Kelly, Jeremy Laird, Gary Marshall, Tom McNamara, Matthew JC. Powell, Shaun Prescott, Dom Reseigh-Lincoln, Mayank Sharma, Craig Simms, Luis Villazon, Henry Winchester, Darren Yates

SENIOR MANAGEMENT
Chief Operating Officer **Neville Daniels**

COMMERCIAL
Sales Director Paul Marttila
paul.marttila@futurenet.com

ABOUT THE MAGAZINE
APC is published by Future Publishing Australia.

Distributed in Australia and NZ by Network Services.

Printed by Webstar
All contents copyright Future Publishing (Overseas) Ltd, trading as Future Publishing Australia copyright 2013. All rights reserved. While all care is take to ensure information is correct, please check prices and specifications before purchase.

PRIVACY STATEMENT
This issue of APC published by Future Publishing Australia may contain offers, competitions or surveys which require you to provide information about yourself if you choose to enter them or take part in them (Reader Offer). If you provide information about yourself to Future Publishing Australia, Future Publishing Australia will use this information to provide you with products or services you have requested, and may supply your information to contractors to enable Future Publishing Australia to do this. Future Publishing Australia will also use your information to inform you of other Future Publishing Australia publications, products, services and events. Future Publishing Australia may also give your information to organisations that are providing special prizes or offers and are clearly associated with the Reader Offer. Unless you tell us not to, Future Publishing Australia may give your information to other organisations that may use it to inform you of other products, services or events to give to other organisations that may use it for this purpose. If you would like to gain access to the information Future Publishing Australia holds about you please contact Future Publishing Australia's Privacy Officer.

Future

ABOUT FUTURE
Future Publishing Australia is part of Future plc. Future produces carefully targeted special-interest magazines, websites, and events for people who share a passion. We aim to satisfy that passion by creating titles offering value for money, reliable information, smart buying advice, and which are a pleasure to read or visit. Today we publish more than 180 magazines, websites and events, with over 100 international editions of our magazines published under license in 30 countries around the world. Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR)

Peter Allen Chairman of the Board
Zillah Byng-Maddick Chief Executive Officer

FIPP

Don't be the weakest link

APC's editor reveals what he does to keep his online identity secure.

Here's a fact that some people may find a little confounding: I have absolutely no idea what 99.5% of my passwords are. Over the last 5 years or so, I've signed up for over 220 different online services – that covers everything from email and forum accounts to online banking and shopping to digital platforms like Steam – and in most cases, I couldn't tell you what specific combination of email address (or username) and password would get you in. Got no ruddy idea. Of those 220 sites, I can recite exactly three passwords off the top of my head – and all those are long and unique phrases that would be impossible for someone (even people who know me intimately) to guess.

Since about 2009 I've been using the open-source KeePass program (**keepass.info**) to generate and manage all my passwords, which means that in all but a few key places, they're an incomprehensible combination of upper and lower-case letters, numbers and special characters. All of those passwords are stored in a single encrypted file, which can only be unlocked with a master password – and that's one of the only three passwords I know off the top of my head. KeePass (or KeePass X when I'm using a Mac or Linux machine) isn't the only password manager around and there are arguably commercial alternatives that offer better ease of use, such as web-based interfaces that don't require you to have a password manager installed or the encrypted password file always with you. (In my own case, I've never found installing KeePass too much of a burden to consider switching, and I sync my password file using a cloud storage provider so I can get to it anywhere.)

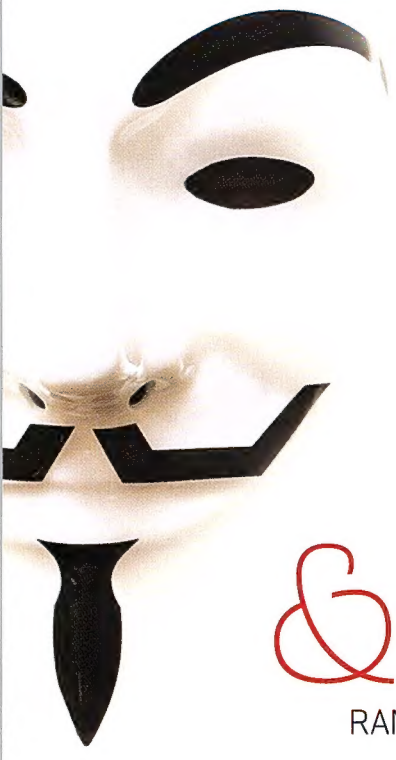
That may all sound unnecessarily complicated, but in practice it's a pretty simple system. Signing up for a new site or service? Open KeePass, generate a new password and copy and paste it into the sign-up form. When you need to log in again, just open up KeePass, find the alphabetically-listed entry and copy-and-paste the password. The Windows client even has auto-typing, so you can press Ctrl-Alt-A and (provided it's named correctly) the username and password will automatically be typed into the correct fields in the web page. Definitely easier than trying to remember 220 unique passwords.

I guess my point here, in a round-about way, is that good security doesn't need to be particularly inconvenient or even cost you a cent. But it may require you to change your habits – at least a little.

DAN GARDINER
EDITOR
dan.gardiner@futurenet.com

Contents

Issue 409 December 2014



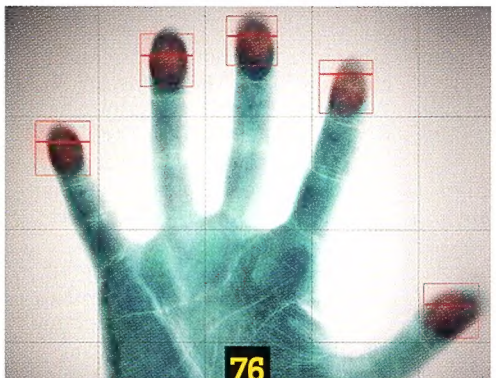
THE REAL THREATS REVEALED
(IN PLAIN ENGLISH)

12 SECURITY SUITES COMPARED
SHIELD YOUR ANDROID
MAC & iOS SECURITY SECRETS

38

TAKE BACK YOUR PRIVACY & SECURITY

RAMP UP YOUR DIGITAL DEFENCES WITH OUR COMPLETE GUIDE TO ONLINE SECURITY, PRIVACY & ANONYMITY



76

THE DANGER OF SECURITY THEATRE

SECURITY THEATRE IS A FRIGHTENING BUSINESS THAT'S COSTING US OUR PERSONAL FREEDOMS. SEE HOW IT AFFECTS YOU EVERY DAY.

» features

12 WINDOWS 10 REVEALED
Microsoft has taken the wraps off its new version of Windows. Windows 10 brings back some old favourites, while looking into a mobile and cloud-ready future.

38 TAKE BACK YOUR PRIVACY & SECURITY
38 Protect yourself
42 How to secure your Mac
43 Security on iOS
44 Security suites on PC
52 Secure your Android

72 THE DANGER OF SECURITY THEATRE
Security theatre is a frightening business that's costing us our personal freedoms. See how it affects you every day.

» technotes

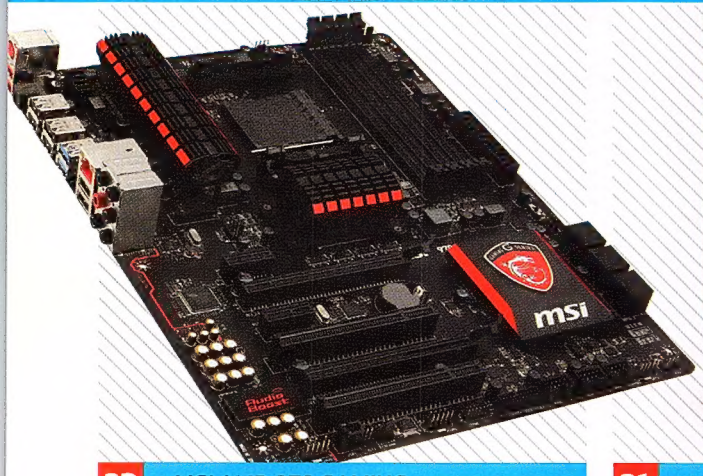
6 NEWS
The latest developments in the tech world.

10 GADGETS
Hot tech gear we want to own.

16 EPINIONS
See what APC's readers are talking about.

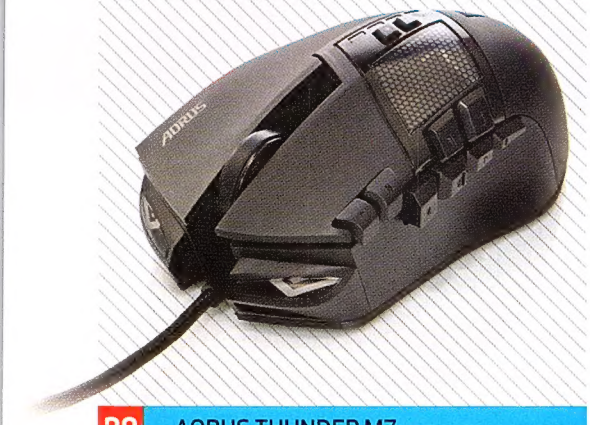
18 END USER
Not everything is plain sailing in the tech world.

"We're actually doing nothing to increase how safe we are and may even be putting ourselves more at risk." The danger of security theatre, p72



23 MSI AMD 970 GAMING

21 LG 34UM95



28 AORUS THUNDER M7

27 GAMDIAS HEBE

22 AMD A10-7800

» the lab

20 LATEST REVIEWS

20 Acer Aspire Switch 10
21 LG Ultrawide 34UM95
22 AMD A10-7800
23 MSI AMD 970 Gaming
24 ASUS DSL-AC68U
26 AMD Radeon R7 SSD 240GB
27 Gamdias Hebe
27 Kingston HyperX Cloud
28 Aorus Thunder M7
28 Rapoo V900
29 Thermaltake Ventus
29 Motorola Moto G (2014)

32 SOFTWARE REVIEWS

32 Windows software
33 Apple Mac software
34 iOS App Store
35 Google Play (Android)
36 Windows Phone 8 apps

» how to

78 QUICK TIPS

We fix readers' computing problems.

80 TUTORIALS

80 Create a slimmer, faster Windows 7
84 Build a Linux photo server
88 Move your DVDs to iTunes for sharing
90 Use an old iOS device as a security cam
92 Determine where to store data for your macros

94 MASTERCLASSES

94 PC Builder: Big capacity, small box
100 Arduino: Arduino Basics #2 – Measuring temperature and humidity
102 Raspberry Pi: Guard your home with a Pi
106 Coding: Java part 2 – variables, input and interest rates

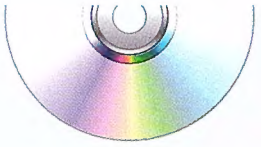
» downtime

110 GAMES

High-performance playtime.

114 CHIP CHAT

News from the world of geekdom.



» on the disc

- » Ashampoo Gadge It
- » Abelssoft PC Fresh 2014
- » 1-abc.net Startup Booster 6
- » Beneath a Steel Sky: Full Game
- » Windows Booster Toolkit

Find your disc inside on page 83.

technotes

» NEED TO KNOW

Incoming: AMD'S FreeSync screen tech

AMD's plans to bring its FreeSync frame rate syncing technology to PC monitors are firming up. FreeSync is AMD's response to Nvidia's G-Sync tech, promising super smooth gaming performance. Already, the FreeSync-enabling Adaptive-Sync protocol has been included in the upcoming 1.2a update to the DisplayPort interface. Now AMD says key manufacturers of monitor scaler circuits for displays are also on board. According to AMD, the new scaler boards will appear in monitors in early 2015 and has also provided a GPU compatibility list. All AMD Radeon graphics cards in the HD 7000, HD 8000, R7 and R9 Series support FreeSync's basic video playback and power-saving features. But you'll need an R9 295X2, 290X, R9 290, R9 285, R7 260X or R7 260 GPU for the really important bit — dynamic refresh rates in gaming.

Blazing platters

Backup gurus Backblaze have released their regular 'state of the hard drives' report, and it'll make uncomfortable reading for some HDD manufacturers — and for the people who use their drives, too. It's bad news for Seagate in particular, with the failure rate of its 3TB drives jumping from 9% to 15% compared to January 2014. Western Digital's 3TB drives didn't fare much better, with the failure rates jumping from 4% to 7%.

The 'Firefox OS Chromecast' is on its way

Love the idea of Google's Chromecast but find it too limited? The Firefox-OS-based Matchstick is for you.

Google's Chromecast device has been a pretty big success, thanks both to a low price and an easy-to-use, plug-and-play interface. Not everyone is pleased, however, and despite it being built on the Linux-based Chrome OS, many users are finding it too closed for comfort. Step forward, then, the Matchstick, which blew past its Kickstarter funding goal of US$100,000 in just one day (sitting on $362,047 at time of writing).

Like the Chromecast it plugs into an HDMI port on your TV and can stream media, connect with other wireless devices and play nice with online services. It should also give the Chromecast a run for its money price-wise, with a very approachable US$25 pricetag.

What sets the Matchstick apart from Chromecast is that it's the first streaming device to run on Mozilla's open source Firefox OS. According to the makers of Matchstick, they went with Firefox OS because of its adaptable nature. They hope this will lead to lower production costs – and without the need for app approval, it may potentially encourage a huge library of software to appear.

The hardware included in the Matchstick features a dual-core Rockchip 3066 processor, 4GB of on-board storage and 1GB of DDR3 RAM. It also includes an 802.11 b/g/n wireless receiver for connecting to wireless networks. The creators want the hardware to be truly open, so reference designs and hardware schematics are available for download (from **tinyurl.com/nbyze9e**), so if you have the right know-how, you'll even be able to build your own Matchstick. As the creators say: "Our goal was to make a streaming stick that was low-cost, high design, and adaptable without the walled garden for developers that tends to slow progress ... It's what Chromecast wanted to be."

Steam users maligned

If you have a Twitch profile linked to your Steam account, we suggest you check your recent expenditures because a certain malware bot has been infecting users across the platform, accessing their personal details and spending their hard-earned cash. The threat was discovered by Finnish security software maker F-Secure, which was quick to inform its community. "It might be helpful for the users if Steam were to add another security check for those trading several items to a newly added friend and for selling items in the market with a low price," it said. "This will lessen the damages done by this kind of threat." The warning has spread throughout Steam's own online populous, with Valve stressing the need for vigilance among its users.

Dyson 360 Eye to be sucking our way soon

Vacuum cleaners, even autonomous robotic ones, are a little broad for APC perhaps, but when we laid eyes on the decidedly droid-esque visage of Dyson's upcoming 360 Eye we just knew we had to share it with you. The cylindrical, tank-resembling Dyson 360 Eye incorporates the company's effective 'Radial Root Cyclone' technology and combines this with an advanced 360-degree vision system. This system, says Dyson, "uses complex mathematics, probability theory, geometry, and trigonometry to map and navigate a room." Instead of wheels, the 360 Eye will trundle around on small tank tracks and can be linked to a smartphone app so you can monitor its progress. Coming soon for an expected premium price (this is Dyson, after all).

What happened to the iPhone 6's sapphire display?

It seems the company producing the super-tough screens couldn't stand up to the drop test.

By far the biggest unfulfilled rumour about the iPhone 6 and iPhone 6 Plus was the suggestion that they would come with ultra-durable (and stab-proof) sapphire crystal displays: the same material currently used for the iPhone's Touch ID home button, its rear camera lens, and what will appear on versions of the Apple Watch next year.

On the surface, the evidence was compelling. Back in November 2014, Apple signed a multi-year US$578 million deal with GT Advanced Technologies to build a new 1.4 million square foot facility in Mesa, Arizona, dedicated to churning out sapphire. The plant was reported to be in possession of enough crystal-growing furnaces and mature crystal-growing processes to generate over twice the amount of sapphire as the current output globally.

In February, Apple was then reported to have snapped up multiple sapphire screens from the company that was engaged to make them for the abandoned Ubuntu Edge smartphone. There were patents filed by Cupertino, too, including a hybrid sapphire laminate and a technique for strengthening glass using a method of "ion implanting" (which was eventually used in the iPhone 6) rather than straightforward chemical coating.

However, when Apple unveiled the iPhone 6 family of devices on September 9, no mention whatsoever was made of tougher displays, and shortly after, GT Advanced Technologies unexpectedly announced it was filing for bankruptcy protection, a move that apparently caught Apple by surprise. It seems as though Apple was less than pleased with the sapphire prototypes being turned out for possible iPhone displays, with rumours that the screens failed iPhone drop tests. Rather than hold up production, Apple dropped the idea altogether. Something to look forward to in the iPhone 6S or iPhone 7, perhaps?

$4,588,888

How much are three little letters worth to you? If you're Amazon, quite a bit.

US$4,588,888 is how much internet uber-seller Amazon paid for the top-level .buy domain name. The purchase basically means Amazon will be able to sell domain names ending in '.buy' (in addition to its current '.com' suffix), which could be hugely lucrative (seeing as buying stuff online is apparently a thing people enjoy a fair bit these days). Still, those letters don't come cheap, not at all: at US$4,588,888, each individual letter of the .buy domain is alone fetching over US$1.5 million.

45%

Almost half of us aren't adequately warning our kids of online perils.

45% of parents admit that they haven't warned their children of the dangers of the internet, despite 74% agreeing that it was their responsibility to keep their little 'uns safe online. The research, conducted by OnePoll on behalf of Disney, found that parents felt comfortable discussing Father Christmas, swearing and even the birds and the bees, but didn't know how to broach the subject of staying safe online.

86%

Nearly nine out of ten people will discuss current affairs in person, whereas online...

86% of people are willing to have an in-person conversation about current affairs, compared to just 42% who would be willing to discuss it on a social networking platform. The research, conducted by the Pew Research Internet Project, suggests that instead of hiding behind the anonymity of Facebook or Twitter, people would rather not discuss divisive issues such as the Edward Snowden hacking case at all, unless they were certain their friends or followers would agree with them.

5.5 million

EA Sports shares numbers on its most successful game demo ever, *FIFA 15*.

Well over five million punters tried out EA Sports' just-released *FIFA 15*, making it the company's most-played demo of all time. EA recently announced that more than 5.5 million people downloaded the game across PC, Xbox One/360 and PlayStation 4/3 platforms. Reviews of the game have generally been positive, although our sister site *PC Gamer* had issues with the pace of the game: "*FIFA 15* is probably EA's most convincing and varied effort... but it still struggles in some key areas. It might look like football, but it rarely flows like football. [Matches] take place in constant transition, far more like basketball than the gradual shifts in momentum that 'real' football typically enjoys."

$250K

How much does it cost to say no to Uncle Sam?

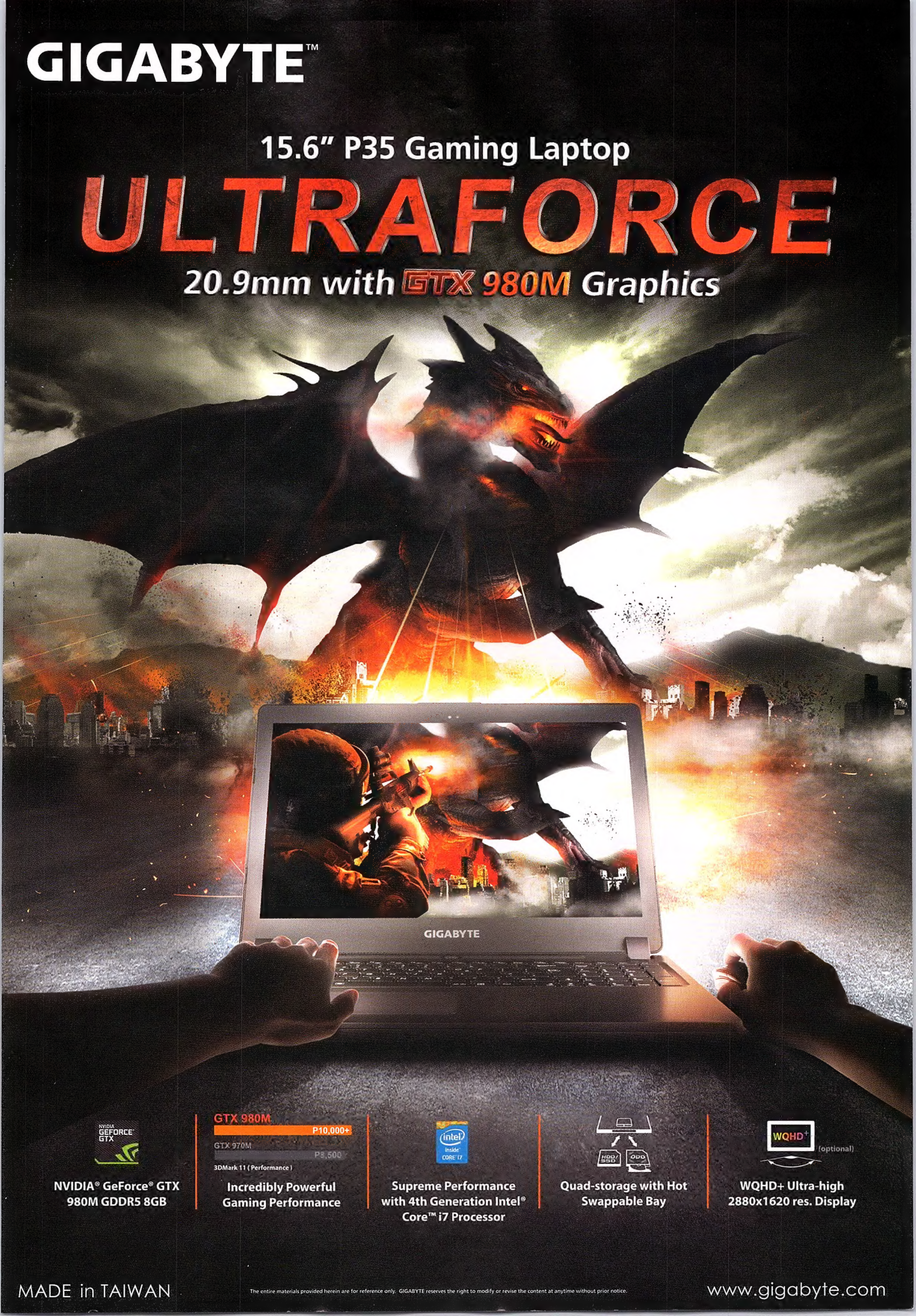
Yahoo alleges it was threatened to be fined a quarter of a million US dollars — per day — by the US National Security Agency for not releasing user data as part of the PRISM program. Yahoo apparently stuck to its guns and highlighted the unconstitutional nature of leaking data, until it was ordered by a court to hand it over. Ron Bell, Yahoo's General Counsel, recently released more than 1,500 pages of formerly secret documents detailing the web company's 2007-2008 challenge to the PRISM program.

GIGABYTE™

15.6" P35 Gaming Laptop

ULTRAFORCE

20.9mm with GTX 980M Graphics



NVIDIA® GeForce® GTX 980M GDDR5 8GB

Incredibly Powerful Gaming Performance

Supreme Performance with 4th Generation Intel® Core™ i7 Processor

Quad-storage with Hot Swappable Bay

WQHD+ (optional)

WQHD+ Ultra-high 2880x1620 res. Display

MADE in TAIWAN

The entire materials provided herein are for reference only. GIGABYTE reserves the right to modify or revise the content at anytime without prior notice.

www.gigabyte.com

technotes

» GEAR WE WANT

SEEK THERMAL

US$199 | THERMAL.COM

This thermal camera plugs into iOS or Android devices (there's a different version for each platform), giving you a heat-sensing view on your phone's screen of what's around you using the accompanying app. The camera may be a meagre 205x156 pixels, but since those pixels can detect heat from -40°C to 330°C, we'll chill out (sorry) a bit and let it off. While it may be cool (we'll stop now) to see things moving in a Predator-esque thermal view, Seek Thermal has pointed out some of its more practical uses. Aside from seeing living things moving in the dark (locate your dog if it runs off!), the app can tell you how hot something actually is, which is handy for cooking. There's even household DIY tasks where a heat view can come in useful.

FLEXSON VINYLPLAY

$TBC | FLEXSON.COM

As vinylphiles will tell you, the record isn't dead yet. Sales of vinyl music in 2014 (as of late September) have already beaten figures for the whole of 2013, so it's definitely back – at least temporarily – to save you from those horrible, cold digital audio reproductions. This turntable can be connected into most modern hi-fi systems, but also, in a pleasant old-meets-new touch, can integrate wirelessly into Sonos multi-room setups – it has has even been designed to match the style of Sonos' speakers. It's nice to think you can pop a record on in the lounge room or study (or wherever it is most people keep a turntable these days) and hear the rich analogue sound play throughout any room in the house. Australian pricing is still TBC, but it launched earlier this year in the UK for £330.

MEMORING USB FLASH DRIVE

US$28 | MOLLASPACE.COM

We've probably all had a time when we needed to give a large file to someone, and the easiest way to do that was 'sneakernet' – carrying it to them on a USB drive. But what if you forget the drive? What if it falls out of your pocket? Isn't there a better way to carry the drive? Well, we're not sure about 'better', but this is definitely an alternative: this 4GB drive is a ring. As in, for your finger. Walk around with it attached to your hand and it'll be easy to know it's still with you, safe and sound. Now, while we've no doubt that you really would always know your files are safe with this on your finger, it's kinda huge. In fact, it's so chunky that you'd start to have the problem of never, ever being able to forget it's there. Still, at least it comes in a range of funky colours, and though it's poor value for a 4GB drive, it's not the worst we've ever seen, seeing as it does something else, er, 'clever'.

MASTER YOUR BATTLEFIELD.

THE TYON'S X-CELERATOR

is an innovative, two-way analog stick.

GAMING HAS CHANGED, THE BATTLEFIELD HAS EVOLVED

The X-Celerator analog thumb paddle's amazing control configurations, ingenious placement of the Fin Switch, a deadly precise 8200 R3 Laser Sensor, ROCCAT's powerful driver, 16 buttons, 31 assignable functions and a vivid 2 way lighting system with 16.8 million colors – the ROCCAT Tyon Gaming Mouse takes gamers to the pinnacle.

ROCCAT TYON

GET THE TYON NOW
WWW.ROCCAT.ORG/TYON

EB GAMES

Windows 10 revealed!

Microsoft has taken the wraps off its new version of Windows. Windows 10 brings back some old favourites, while looking into a mobile and cloud-ready future. Graham Barlow & Dan Grabham go hands on.

Microsoft has announced the successor to Windows 8, cutting version 9 out of the chronological sequence altogether and jumping straight to version 10.

"I think we'd all say that Windows is at a threshold," said Terry Myerson, executive vice president of the Operating System Group at Microsoft, introducing the new Windows 10 while making a joke about the well-known codename for the next OS, "and now its time for a new Windows."

The Windows 10 name came as a surprise to everyone, since most of the press had speculated for months that it would be logical for the new operating system to be called Windows 9. But as it turns out, that name wasn't even in the running, and even Windows 10 wasn't the first choice for Microsoft.

"Considering our One Microsoft strategy," said Myerson, "the names of our products like Xbox One, OneNote and OneDrive, it's obvious what the name should be: Windows One. But unfortunately, Windows 1.0 has been done by the giants that came before us [Bill Gates and the original version of Microsoft Windows], and because we're not building an incremental product, the new Windows is Windows 10."

Microsoft's desire for the name to be a break with previous versions of Windows may be wishful thinking, as the features revealed so far look essentially like Windows 8 with a Start menu. In fact, Windows 10 seems like what Windows 8 should really have been in the first place.

FLEXIBLE AND ADAPTABLE

This time though, it looks like the company is getting it right. For a start, Windows 10 will run on a wider range of devices than any previous version of the operating system – from tiny Internet of Things style gadgets to smartphones and tablets, all the way up to full-sized desktop PCs. In effect, the new OS is a continuation of Microsoft's much criticised 'Windows everywhere' strategy, which stands in stark contrast to Apple's use of separate operating systems for different devices – OS X for desktops and laptops, and iOS for tablets and smartphones.

After some trial and error, it seems that Microsoft might have hit the mark by giving users of Windows 10 an experience tailored the type of device they are using. So expect touchscreen features on touchscreen devices, and traditional desktop visuals for devices that come with mice and keyboards.

Microsoft's 'one product family' approach has benefits for developers too, who will now be able to write an app just once and have it run on a whole range of devices, with everything available from just one store.

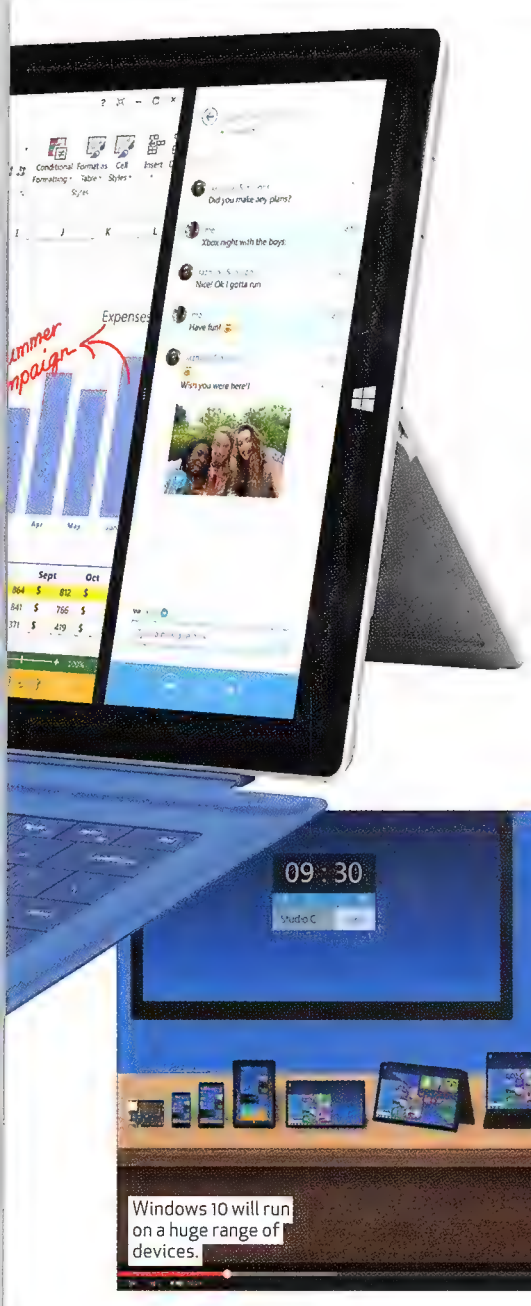
DOWN TO BUSINESS

But the real target for Windows 10 are what it calls 'enterprise users'. It's nothing to do with *Star Trek* – Microsoft wants to persuade the legions of businesses currently using Windows 7 to upgrade their PCs to Windows 10.

Many enterprise PCs are still running Windows 7, and companies' system administrators have held off upgrading to Windows 8 because the change in user experience was perceived as too radical. With Windows 10, Microsoft is aiming to create an experience that will be immediately familiar to people, whether they're used to running Windows 7 or 8. That means some of the staples of Windows 7 (including the Start menu) are going to make a welcome return. It also means that Windows 10 will be backwards-compatible with all the apps you're running now. "Windows 10 is going to be our greatest enterprise platform ever," said Myerson.

The new Start menu in Windows 10 looks like a hybrid of Windows 7 and 8. All the familiar Start menu items from Windows 7 are there, including jump lists, All Programs (now called All Apps) and Search (which now looks for results on the internet as well as your PC). There are also a few new additions, including a simple power button for restarting or turning off the PC and a 'me' tile at the top of the menu. Most impressive of all is a new sidebar that's like a miniature version of the Windows 8 Start screen, complete with Live tiles, grafted onto the side of the menu. It initially looks as unnatural as it sounds, but you get used to it very quickly. The new Start menu is highly customisable, too; you can change the size of tiles with ease, and make the whole menu bigger or smaller.

Windows 10 also solves the issue in Windows 8 where Modern apps would run full screen, but traditional apps would exit to the desktop to run. Now all apps can run inside traditional, resizeable, windows on the desktop. They snap to the side of the screen when you move them around too, so it's easy to make your desktop look nice when running multiple apps. In fact, there's a new Windows 10 feature called Snap Assist that suggests other open apps you might like to snap as well. Again, all these features are



designed to make Windows 7 users feel at home in the new OS, with a Taskbar and Start menu always visible.

Windows manager Joe Belfiore was the first person to demonstrate Windows 10. "We want all these Windows 7 users to have the sentiment that, yesterday they were driving a first generation Prius, and when they got Windows 10 they didn't have to learn to drive something new, but it was as if we got them a Tesla," he explained. From our initial look at the new OS, we'd say that's a fair analogy. It's different, but works in a familiar way.

MULTITASKING

It's no coincidence that productivity and multitasking are areas where Apple's mobile devices are often criticised, and that's clearly why they form a key part of Microsoft's vision for Windows 10. A new button (currently called Task View, although its final name may change) lives in your taskbar and shows live thumbnails of all your running apps in one screen. Users of OS X will recognise it as being somewhat similar to the Exposé feature that Macs have had for a while now.

Microsoft has also added another feature familiar to Apple users – multiple desktops. These are accessible from Task View, and are simply a way of organising all your open apps into different areas – so you could have one desktop with all your financial apps open on it, another for web browsing and email, and so on.

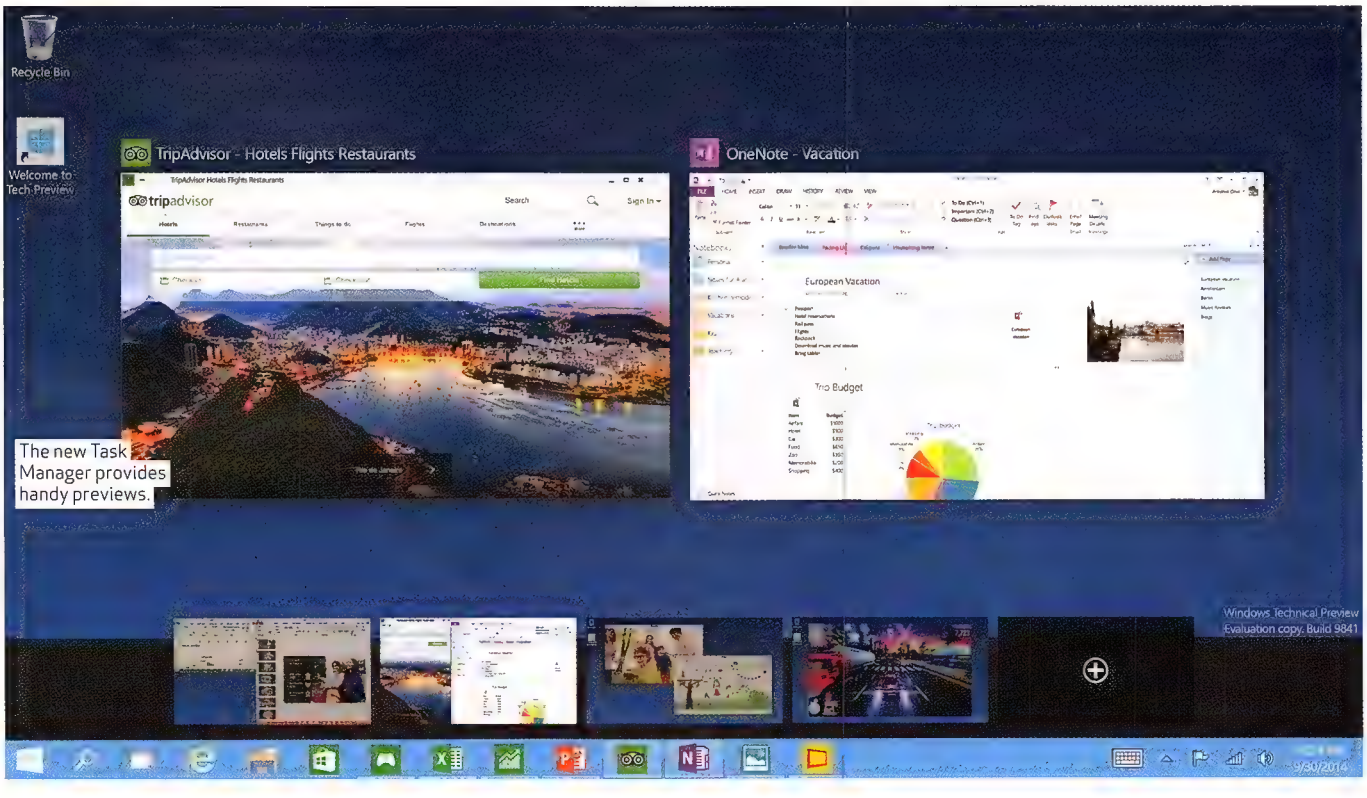
Microsoft hasn't forgotten users with keyboards either. Windows 10 makes some improvements to the traditional way of switching between apps with the classic Alt-Tab keyboard combination. Now it switches between virtual desktop as well as between apps, so you also switch to the desktop that contains the app you've selected.

There's even something interesting for the real hardcore Windows devotees who use the Command prompt (accessible by typing `cmd` into the Search bar) to perform tasks without navigating menus. Now you can use Ctrl-C and Ctrl-V to copy and paste text to and from the command prompt and Windows.

Windows 10 will run on a huge range of devices.

ONE FOR ALL

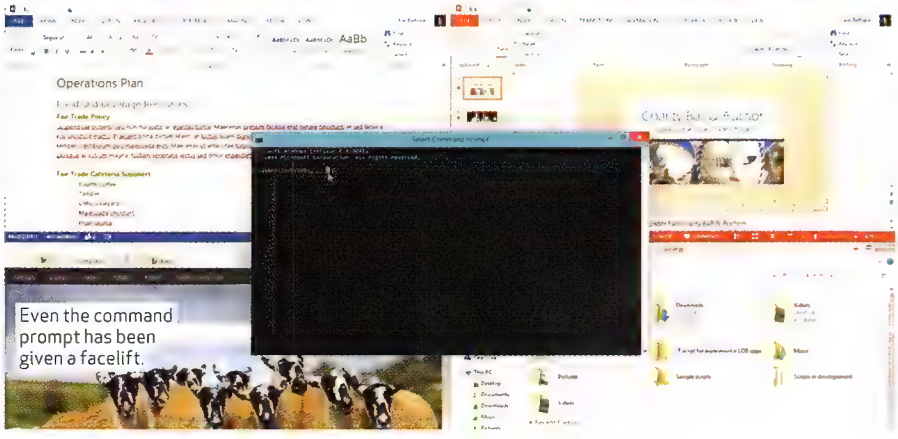
Belfiore conceded that all these little tweaks aren't groundbreaking, but



The new Task Manager provides handy previews.

Modern apps will now run in windows on the desktop.

You can try the new OS now with the Windows Insider Program.



Even the command prompt has been given a facelift.

once you start to put them all together, Windows becomes a lot more useable, which has been the chief criticism of Windows 8 so far. We'd agree, but the real test is how Windows 10 is going to perform on the vast range of devices it is designed for – everything from touchscreen phones and tablets to laptops and full desktop systems.

To this end, Microsoft has introduced a new feature called Continuum. This enables Windows 10 to change its mode of operation for 2-in-1 convertible devices, such as the Lenovo Yoga and Microsoft Surface. When you're using your Windows 10 device as a tablet, Continuum gives you an appropriate view for a touchscreen (including full-screen apps, larger Start screen), but when you attach it to a keyboard and mouse, you get a traditional desktop, Start menu and taskbar. Continuum was actually too new for Belfiore to demonstrate live, so we were treated to a video of it working instead. It certainly looked promising and finally presented a solution to Microsoft's problem of having one operating system work on all sorts of different devices.

Users of touchscreen devices will also be pleased to know that rumours of the death of the Charms bar have been greatly exaggerated – it's still there if you swipe right. The screen that Belfiore demonstrated looked very much like the old Windows 8 Charms bar, but he said he expects the bar to look different in the finished version.

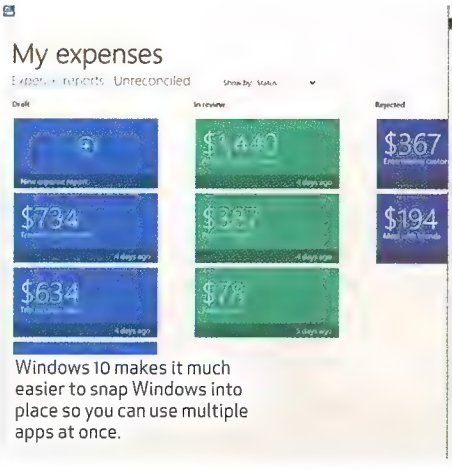
SECOND WIND

The presentation also contained a rare admission from Microsoft that it missed the mark with Windows 8 when it came to the idea of productivity on touch devices. "With Windows 8 we didn't get it quite right," admitted Belfiore. "With Windows 10, we think we have a better approach."

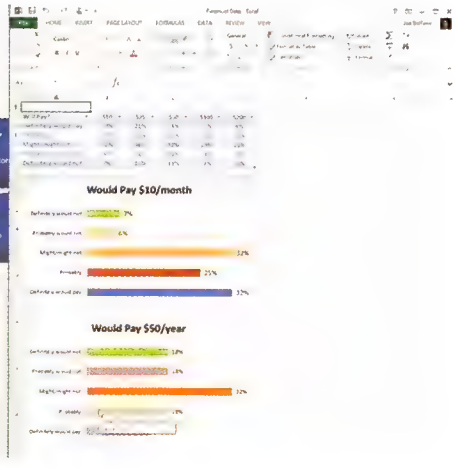
As for launch date and price, we didn't get anything definite, but according to one graphic shown, the 'launch wave' looked like it would take place in the middle of 2015. Myerson said early next year Microsoft will "start talking more about the consumer story" and at the Build conference in April, it's intending to "continue the dialogue of Universal apps".

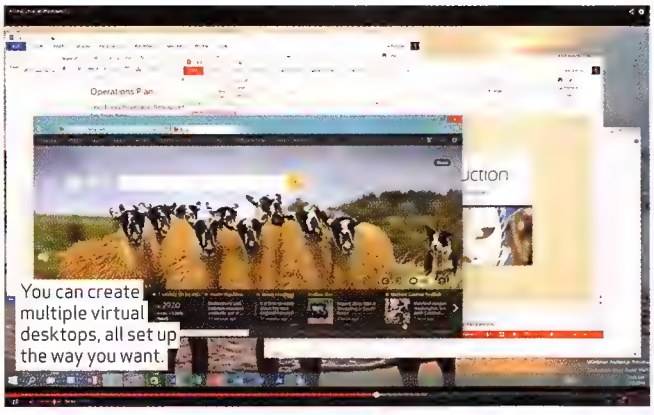
In the end we didn't get to explore much of Windows 10, but we liked what we saw. Microsoft is keen to emphasise that there are lots more consumer features coming in Windows 10, so there are bound to be more announcements to look forward to over the next few months. And once the Technical Preview gets into people's hands, more new features that have been baked-in already will no doubt be revealed.

To us, it looks like Microsoft has done enough with Windows 10 to tempt the millions of Windows 7 users that it is targeting to upgrade. It already looks like there are good reasons for people to switch, but as it stands, the new operating system is hardly breaking new ground, but then we'll hold back judgement until we've seen the final version. We're hope there's lots more in store for us in Windows 10 that we just haven't seen yet.



Windows 10 makes it much easier to snap Windows into place so you can use multiple apps at once.





You can create multiple virtual desktops, all set up the way you want.

"To us, it looks like Microsoft has done enough with Windows 10 to tempt the millions of Windows 7 users that it is targeting to upgrade."

WINDOWS 10's TOP 10 FEATURES

1. TOUCH INTERFACE

Windows 10 is designed to appeal to experts and novices alike, and Microsoft was at pains to point out that it hasn't given up on touch. The Charms bar is still there, for example, although we expect it to disappear if you're using a non-touch PC (see 'Continuum', right).

Microsoft says it wants to 'evolve' the touch interface, which means it will be changing quite a bit. Task switching will no longer work on the left, and combined with alterations to Charms, that's goodbye to most of the problem with Windows 8 . As Joe Belfiore said at the preview, "We want Windows 7 users to feel like they upgraded from a [Toyota] Prius to a Tesla, but they don't need to learn a new way to drive."

2. START MENU

The most noticeable change is the new Start menu. It carries over some features from the Windows 8.1 Start screen, and can be resized to suit you.

3. TASK VIEW

There's a new Task View in Windows 10, so users can switch between virtual desktops. Microsoft has acknowledged that many people use the Taskbar rather than shortcuts such as Alt-Tab.

4. SNAP ASSIST

A new Snap Assist feature helps you decide the best way to snap your apps. You can snap windows into new screens and tile Windows, just as you've been able to since Windows 2.0/3.0.

5. COMMAND PROMPT

Another feature for power users is the ability to use keyboard shortcuts in the command prompt, so you will finally be able to copy and paste commands. Hardly groundbreaking, but very useful.

6. WINDOWS EXPLORER

A new Home location is the new default view in Windows Explorer. There's also a Share button on the Windows Explorer taskbar (we really hope this is in the context menu, too).

7. CONTINUUM

Continuum is an on-the-fly mode for 2-in-1 devices, which detects whether a keyboard has been added or removed and adapts the OS accordingly. For example, a back button appears to help you navigate the desktop with touch if the keyboard is detached.

8. UNIVERSAL APPS

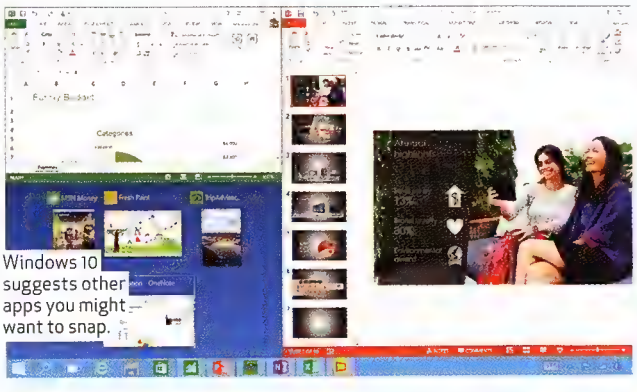
Windows 10 will also usher in a new app model: Universal Windows apps. This is the new name for Metro apps/Modern apps/Windows Store apps. Windows 10 will be able to run on all devices from phones to servers, and there will be one app store for the lot. All older Windows Store apps will work with Windows 10.

9. FLOATING APPS

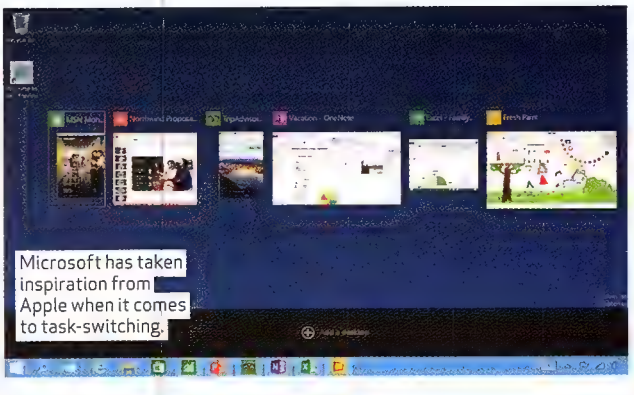
Universal apps also work on the desktop and 'float' in their own windows. On the desktop, these apps have a '...' icon that provides more options. This replaces the commands that used to be in the charms on the right-hand side of the screen.

10. BUSINESS AND ENTERPRISE

Part of the reason why Microsoft demonstrated Windows 10 without all the consumer features is to show enterprises what new the operating system is capable of at this stage. This version of Windows will have plenty of features for businesses, including a customised store and protection for corporate data. Mobile Device Management will be supported for all devices, and Windows 10 will keep personal and corporate data separate.



Windows 10 suggests other apps you might want to snap.



Microsoft has taken inspiration from Apple when it comes to task-switching.

technotes

EPINIONS

"Sure PC gamers can have a geekwank over the ultra high fancy graphics they pay thousands to achieve."

NOT SO DEADLY

There's one glaring flaw with your "console killer" PC (issue 407): it still won't play PlayStation or Xbox games. Nor does it easily allow social multi-player gaming in the one room, nor is it as comfortable by virtue of anchoring you to a desk, nor is it easily transportable to a friend's place, it becomes obsolete far sooner, and it's less user-friendly and reliable.

Ultimately the system of choice comes down to games, and your preferred method to play them. Sure PC gamers can have a geekwank over the ultra high fancy graphics they pay thousands to achieve. I prefer to be comfortable, sociable and, most of all, have access to the games that provide me the most fun.

Ashley Reid

10 BECAUSE 7 ATE 9?

I'm a Windows 7 user who, after looking at it, never bothered with Windows 8. It was just too annoying trying to figure out how to do everything. I've just installed the Windows 10 Technical Preview to check it out. Not on my main PC, of course, it's too far from the final version for that. Just on an old Vistera laptop. My first impression is that if the 10 that ships looks and works similarly to this, I could live with that. If Microsoft makes the upgrade reasonably painless I'd recommend upgrading – especially if Microsoft puts a price on the upgrade that reflects the fact that Windows 7 users like me are quite happy with what we've got. After all, the push to 10 isn't coming from us – it's coming from Microsoft needing to repair and re-establish its severely damaged operating system credibility.

Gordon Drennan

WHO'S RIGHT?

I was going to build the Intel Pentium Anniversary PC described in issue 407, so I went to my local PC retailer and the salesman said the CPU and motherboard won't work together. He said I needed a different CPU in the motherboard first, so that I could update the board's BIOS to support the Pentium Anniversary chip. The way it is in the magazine, I thought I'd just buy the parts you have listed, put them together and they will work. Which is correct please?

Wayne

Ed replies: *Thanks for the email. The CPU and motherboard do definitely work together – we built and overclocked the system featured inside the mag. You can check Gigabyte's compatibility list here for further confirmation:* ***tinyurl.com/lrruyyf****.*

The one potential sticking point is that you'll need the second version of the motherboard firmware (or newer) to support the Pentium Anniversary chip. This was released back in April, so it sounds like the store only has older stock of the B85M-D2V on hand, which must only be running that original, first-release firmware.

As the retailer doesn't seem willing to flash those older B85M-D2V boards it has in stock so they support the Pentium (or order newer stock from Gigabyte), we'd have to recommend shopping with another company with better customer service.

We'd also suggest emailing a few retailers to see if you can get a v2.0 model board; it'll need firmware version FB (release date 18/04/2014) or newer in order to support the Pentium Anniversary chip. ■

APCMAG@FUTURENET.COM

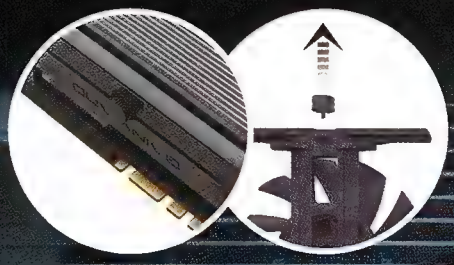
Come on, have your say!

We want to hear what you think. Add to these discussions or email your views (in fewer than 250 words) to apcmag@futurenet.com. All correspondence becomes the property of APC and is subject to editing. Letters must include full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

GAINWARD

ACHIEVA
GROUP OF COMPANIES

NVIDIA GEFORCE GTX



Removable
Easily clean dust by removing the fan from the cooler

3
Quiet and Removable Fans

Stylish
Contemporary Industrial Design

8mm
Copper heatpipes x 5 + Copper Base

Huge
98mm x 273mm die-casting heatsink

PHANTOM

Extreme Silent

Extreme Cool

16% Performance upgrade

GEFORCE® GTX™ 980

New Phantom cooler design

Gainward GeForce GTX 980 Phantom, continue the elegant design of the Phantom cooler. The new Phantom comes with brand new fans design (patent M456684/ZL201320139962.6) that includes

1) Removable fan design – each fan body can be removed to clean if necessary
2) 5 pieces of 8mm copper heat-pipe and copper base - better thermal performance
3) solid structure

With this new outstanding innovated thermal design and optimized product design Gainward GeForce GTX 980 Phantom delivers an extreme gaming performance for enthusiast gamers

VIC

MSY	PC Case Gear	Scorpion
(03) 9700 9771	(03) 9560 2122	1300-726-770
clayton@msy.com.au	www.pccasegear.com	www.scorptec.com.au

SA

MSY
(08) 8212 1656
adelaide@msy.com.au

QLD

MSY
(07) 3290 1908
slackscreek@msy.com.au

NSW

MSY	DCOMP PTY LTD	PC MEAL	IJK
(02) 9726 1997	(02) 4721 3457	1300-366-866	(02) 9745 0877
ultimo@msy.com.au	www.dcomponline.com.au	www.pcmeal.com.au	www.ijk.com.au

WA

MSY
(08) 9344 1002
balcatta@msy.com.au

NSW

NetPlus Micro Computers
(08) 9242 7288

Who's reading who?

A flare-up over ebook privacy is another reminder of why you always ought to pay attention to the fine print.

We love ebooks and e-readers here at *APC* as they're such an easy and efficient way of enjoying our favourite reads, but a recent blowup over ebook privacy has us reappraising the virtues of print! E-literature guru *The Digital Reader* (the-digital-reader.com) broke the story that Adobe Digital Editions 4.0, the e-reader software commonly used by oodles of public libraries around the world to give patrons access to ebooks, was keeping a log of each title readers added to their personal collections and reporting this information back to Adobe.

After receiving the tip-off from a "hacker acquaintance", *The Digital Reader* found: "Adobe is gathering data on the ebooks that have been opened, which pages were read, and in what order. All of this data, including the title, publisher, and other metadata for the book is being sent to Adobe's server in clear text."

Once the allegations blew up online, Adobe responded, saying: "All information collected from the user is collected solely for purposes such as license validation and to facilitate the implementation of different licensing models by publishers... User privacy is very important to Adobe, and all data collection in Adobe Digital Editions is in line with the end user license agreement and the Adobe Privacy Policy."

The Digital Reader, for one, remains unconvinced: "I don't know about you, but I don't see how sending a user's reading history in clear text over the web could possibly be in line with *a privacy policy*." (Emphasis ours.) We're rather inclined to agree!

PASSING THE HACK BUCK

Another day, another unprecedented online hack. No sooner had we moved past the iCloud nude celebrity scandal than both Snapchat and Dropbox found themselves embroiled in damage control over broad-scale privacy breaches. In Snapchat's case, tens of thousands of images from an estimated 200,000 user accounts were leaked online; in response, the company stridently proclaimed "Snapchat's servers were never breached and were not the source of these leaks", laying the blame on third-party smartphone apps that piggyback on Snapchat's API - in contravention of the platform's terms of service - and which can be used to save and share Snapchat's otherwise impermanent (in theory anyway) images. In this case, it's alleged that one such third party, Snapsaved.com, was hacked, although others have reported internal Snapsaved collusion was involved in the leak.

Meanwhile, over at Dropbox, a reported seven million (!) account credentials were leaked online, but once again we saw a similar retort from the company: "Recent news articles claiming that Dropbox was hacked aren't true. Your stuff is safe. The usernames and passwords referenced in these articles were stolen from unrelated services, not Dropbox. Attackers then used these stolen credentials to try to log in to sites across the internet, including Dropbox."

There's obviously a trend here. The biggest cloud services often have the resources to set up robust security measures for their servers and operations; protections the smaller players may not be able to afford or implement. For the end user, the message is clear. Don't reuse your core passwords — ever — let alone with minor services that may not be able to protect them adequately, and don't compromise your use of legitimate apps with unauthorised third-party add-ons. (Although private photo-sharing services like Snapchat are a risky proposition anyway, to be honest, since you've always got to rely on your recipient acting appropriately too.) ■

ENDUSER

Share your stories!

If you have an interesting story about technology users, their experiences and the issues that affect us all (whether funny or serious), email us at **apcmag@futurenet.com**. All correspondence becomes the property of *APC* and is subject to editing. Letters must include writer's full name, street address, suburb, state and phone number to be considered for print publication. Address and phone details will not be published.

PLEXTOR

www.plextor.com

Plextor
Breaking The Speed Barrier

M6e

A high-performance PCie gaming SSD with driver-free ACHI support and selectable legacy BIOS/fast UEFL Booting

Sequential read and Write up to 770 / 625 MBs
Random Read and Write up to 105K / 100K IOPS
128GB / 256GB / 512GB

M6 PRO with PlexTurbo

Intelligent PlexTurbo Technology enables tremendous performance boot beyond SATA III limitation

Sequential read and Write up to 545 / 490 MBs
Random Read and Write up to 100K / 88K IOPS
128GB / 256GB / 512GB / 1TB

M6S

Boot up to Dominate
Low power consumption for extra battery life. It features faster boot time, shorter application load time and overall improved system performance.

Sequential read and Write up to 520 / 440 MBs
Random Read and Write up to 94K / 80K IOPS
128GB / 256GB / 512GB

M6M

Ultra Mini, Ultra Mobility

Sequential read and Write up to 520 / 440 MBs
Random Read and Write up to 94K / 80K IOPS
64GB / 128GB / 256GB / 512GB

True Speed
Sustained High Performance

True Protect
Unequalled Security And Data Accuracy

www.plextor.com

SYNNEX

Synnex Australia Pty Ltd
Phone : 1300 100 100 / Fax : 1300 100 103 / Email : sales@synnex.com.au
Address : 92 Carroll Road, Oakleigh South, VIC, 3167, Australia
www.synnex.com.au

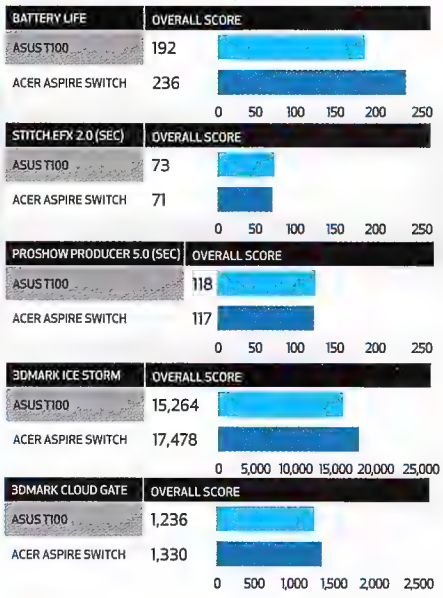
apc RECOMMENDS

TABLET

$599 | WWW.ACER.COM.AU

LABS BENCHMARK RESULTS

For comparison, the Switch was tested against an ASUS Transformer Book T100 with an Atom Z3740, 2GB DDR3, 64GB flash storage, and Windows 8.1.



Acer Aspire Switch 10

A new contender for the Windows 8.1 tablet-hybrid crown.

If Amazon's list of best-selling laptops is any indication, there's quite a market for Windows 8.1 convertible laptops — and as of late, the lion's share of buyers has been sinking their money into ASUS's Transformer Book T100. Acer seems eager to take on the people's choice with its Aspire Switch 10, a similarly spec'd 10.1-inch (1,280 x 800-pixel) convertible with two key design differences.

When it comes down to internals, the Switch 10 essentially contains the same internals as the T100. Its 1.33GHz Atom Z3745 CPU is just a slightly newer version of the T100's Z3740 that features a few small adjustments to the onboard graphics specs, and the benchmarks reflect the narrow gap in performance. In most of our tests, the Switch 10 only edged out the ASUS T100 by slim margins.

Where the Switch 10 sets itself apart is through its inclusion of a 500GB hard drive inside its keyboard dock, with the latter locking in place via a two guides and a magnetic connector. That extra hard drive (supplementing a 32GB internal SSD) means that, when docked, you've got a heap more storage space than most other budget 2-in-1s. And the latter magnetic connector is a handy feature too, and one we much prefer over having to press a button in order to pull away the tablet for independent use. Even clumsy folks will find it easy to separate and reattach the Switch 10's parts without having to place the laptop on a table for stability.

The trackpad is also notable, with responsive, firm buttons and a generous size. The downside to the latter is accidental mousing when typing on the small keyboard. If you've got large hands, you'll be in for a lot of frustration if you don't adjust the angle of your hands while typing, as there's no palm rejection option available.

If that were our only main quibble with the Switch 10, we'd likely still pick it over the T100, as it has a brighter screen, better battery life, and runs just as smoothly for basic productivity and the kind of light media consumption these lower-end laptops are meant for. Its handful of ports — HDMI, microSD, headset/mic jack, micro USB, and full USB — let us do day-to-day tasks like transfer photos from a camera, chat over Google Hangouts, and watch flicks on a much bigger second screen; YouTube videos and ripped Blu-ray files ran without a hitch while Spotify, Word, Excel, and Firefox with a handful of tabs were loaded in the background. We also got nearly an hour more of battery life in our rundown test than on the ASUS. And while the Switch 10 feels a bit too dense to just throw into a bag and carry everywhere with you at all times, it's still lightweight enough to take on an extended trip and get some work done — a sort of netbook successor that offers what netbooks should have in the first place. It, like the T100, even comes with a Microsoft Office (here, that's a 1-year Office 365 subscription).

Unfortunately, the Switch 10's keyboard makes it suitable only for the most emphatic typers (or those willing to, for whatever reason, bring a separate Bluetooth keyboard along with them). Light typers will find themselves swearing constantly under their breath when a key doesn't register. This, in addition to a lack of USB 3.0 ports, mean this doesn't quite outdo the ASUS T100 on every front. But it's definitely worthy of winning many hearts, regardless. ■

Verdict

Features ★★★★
Performance ★★★★
Value ★★★★

Bright IPS screen; magnetic connector; good battery life. But, no palm rejection for the trackpad; incredibly stiff keyboard.

★★★★

apc RECOMMENDS

MONITOR

$1,299 | WWW.LG.COM.AU

LG UltraWide 34UM95

The first Thunderbolt 2-equipped 21:9 display is a pricey cinematic marvel.

When the first wave of UltraWide 21:9 monitors landed back in 2012, it felt like we were taking one step forward and one step back. On the one hand, the extra desktop space at the sides meant you could replace your dual monitor setup with a single display – useful for stretching out spreadsheets or watching movies in their native "cinematic" aspect ratio.

However, due to their uncommon pixel-resolution of 2,560 x 1,080, 21:9 monitors suffered from a lack of vertical space and resulted in a cramped letterbox-like working area compared to 1440p panels. What's more, they were typically more expensive than their 16:9 counterparts.

Step up the LG 34UM95. It's built to a mantra of "bigger is better," giving you 34 inches of 3,440 x 1,440-pixel display with a 21:9 aspect ratio. This larger working area is the equivalent of running two 20-inch monitors side-by-side with resolutions of 1,720 x 1,440 pixels (6:5). It's huge. At 109ppi, it also has an advantage over 4K monitors in that, while not as sharp, the on-screen text and UI elements are perfectly readable without having to adjust OS scaling settings.

> "This larger working area is the equivalent of running two 20-inch monitors side-by-side with resolutions of 1720 x 1440 pixels (6:5). It's huge."

With a height of just 18.5 inches, it's not as overbearing as 27- or 30-inch monitors and you don't have to sit as far back from it, making it a better fit for smaller desks. The panel rests on what LG calls a "Crystal Float Stand," which is made of a see-through perspex material. It's attractive and clearly inspired by the Mac's design, but in the absence of adjustable height, you'll have to put some books underneath it to raise it up.

The display itself features an IPS panel with 1.07 billion colours, a brightness rating of 320cd/m2, a contrast ratio of 1000:1 and excellent 178-degree viewing angles. Tested with our colour calibrator, the 34UM95 covered 100% of the sRGB channel. It produced rich colours that popped and deep, inky blacks.

Spin the 34UM95 around and you'll find a headphone jack, HDMI, DisplayPort, two Thunderbolt ports, three downstream USB ports (and one upstream to a Mac), plus a Kensington security lock. Under the bezel is a joystick that's used to navigate the menu controls, while its two inbuilt speakers are decent. It's also the first non-Apple monitor to feature Thunderbolt 2 and also supports the new Mac Pro. LG is clearly trying to position it as an alternative to Apple's ageing 27-inch Thunderbolt display, and we agree that it's more modern and attractive.

The bottom line? The LG UltraWide 34UM95 is an expensive 21:9 monitor, but the basics are done well: from high colour accuracy to handy four-screen split mode. It is an excellent multi-monitor replacement. ■ **Kane Fulton**

Verdict

Features	★★★★
Performance	★★★★
Value	★★★★

It's a little on the expensive side, but it's a good performer to replace your multi-monitor set up.

★★★★

PROCESSOR

$189 RRP | WWW.AMD.COM

LABS BENCHMARK RESULTS

CPU Rendering Performance

3DMARK UNLIMITED	OVERALL SCORE
AMD A10-7800	293
AMD A10-7850K	311
INTEL G3258	235

0 100 200 300 400 500

Memory Bandwidth Performance

SISOFT SANDRA	GB/S; HIGHER IS BETTER
AMD A10-7800	14.28
AMD A10-7850K	12.23
INTEL G3258	17.77

0 10 20 30 40 50

DX11 Gaming Performance (1080p)

BATTLEFIELD 4	(MIN) AVG FPS: HIGHER IS BETTER
AMD A10-7800	(33) 47
AMD A10-7850K	(37) 51
INTEL G3258	(31) 45

0 10 20 30 40 50

AMD A10-7800

A low power APU for the small form factor, non-gaming crowd.

Every time AMD releases a new processor there's a microsecond rush of excitement, a thrilling jolt that runs up our collective spines at the thought that maybe, just maybe, AMD has at last released a genuinely cool and competitive straight CPU. That rush of excitement quickly recedes, fading in the miserable realisation that there's still no revival of the desktop FX line. All we're left with is just another APU. Sigh.

So, here is the new AMD A10-7800. It's a slight refresh of the original desktop Kaveri APU line, sitting between the top-end A10-7850K and the middling A10-7700K in terms of both pricing and specs. It's operating with a dual-module Steamroller CPU component, giving it a total of four cores, four threads and the full complement of Graphics Core Next shaders for its GPU part. In current AMD parlance that translates to 12 compute cores comprised of four GPU cores and eight GPU clusters.

That's the same basic configuration as the top-end desktop Kaveri chip. As the A10-7800 is only some 100MHz shy of the peak Turbo mark of the A10-7850K, it doesn't actually deliver much lower CPU performance than the best Kaveri can offer. Importantly for an APU, it's also running the exact same GPU configuration as the top A10 part – there are the full 512 GCN cores and they're all running at the same 720MHz as the A10-7850K.

There's not a lot to get too excited about there then – for a tenner less than the top APU you get one that's only slightly slower. But with the weak CPU power of the Kaveri lineup compared with a similarly-priced Intel chip, you might as well pay the extra if you really have to have an APU. Bear in mind that because the A10-7800 is lacking the all-important K-series tag, there's no overclocking allowed. This is a locked-down CPU that simply cannot do anything about the weak single-threaded performance of its Steamroller cores.

POWER FRIENDLY

It's not all bad news. This APU is a 65W chip, compared with the 95W TDP of both the A10-7850K and A10-7700K. You can even go a little further and knock the TDP down to an impressively low 45W. That will impact the chip's general performance because the lower TDP reduces the base clock of the CPU part, yet it still retains the same top Turbo speed – impressive.

If you're going to be dropping a hefty GPU into your system that doesn't make a lot of difference, but the performance drag that the A10's weak single-threaded power places on the graphics card means you probably wouldn't do that anyway. However, if you're looking for a PC to run purely on the processor graphics of your APU then the A10-7800 is the most efficient, cost-effective option. It's still got the same level of graphical grunt as the top Kaveri and, even though it's got a lower clockspeed, the combined compute power of the GPU/CPU combo will deliver almost as well in accelerated applications. Knock the TDP to 45W, drop in some high-speed memory, and you've got a decent base for a small form factor build.

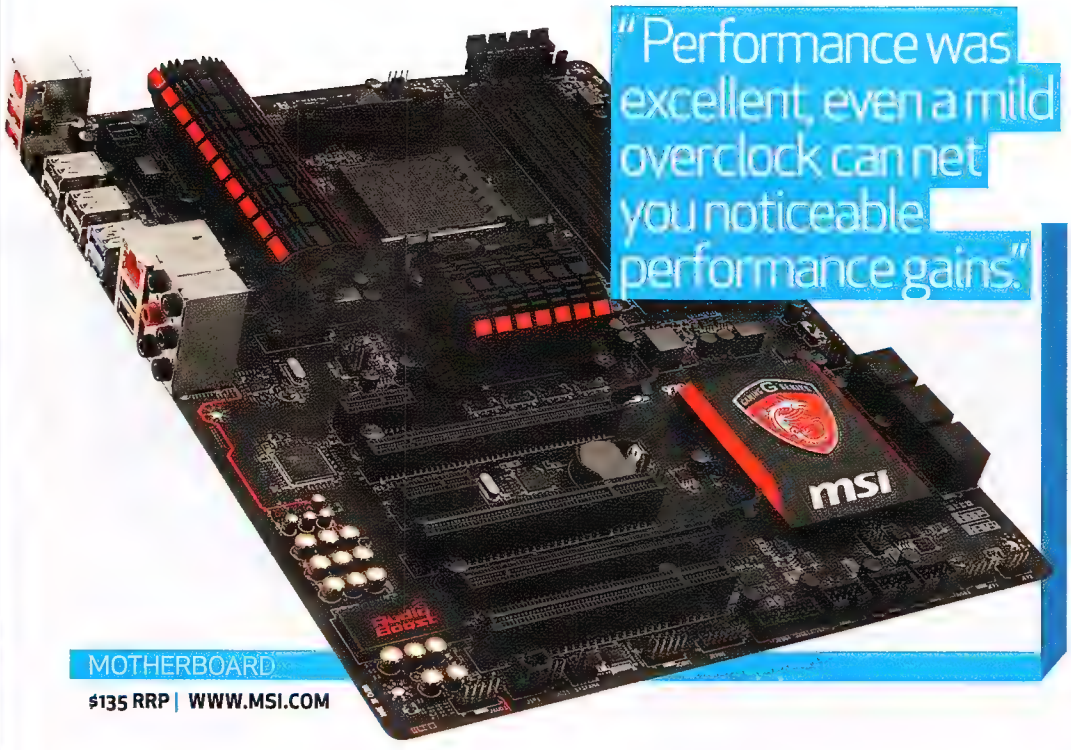
Dave James

Verdict

Features	★★★★
Performance	★★★
Value	★★★★

Very good performance; high-grade support. But a difficult price point and some quirky test results.

★★★½



"Performance was excellent, even a mild overclock can net you noticeable performance gains."

MOTHERBOARD

$135 RRP | WWW.MSI.COM

MSI 970 Gaming

Affordable AMD gaming pedigree.

The MSI 970 Gaming uses the AMD 970 chipset to provide a powerful platform that supports high end FX CPUs and CrossFire, yet can still be built on a modest budget. Intel might still have the edge on single threaded applications, but an AMD system can give very solid multi-threaded performance without blowing the budget.

Built on the ATX form factor, the board has an AM3+ socket and will support Athlon II, Phenom II and FX CPUS – we tested with the 4GHz eight-core AMD FX 8350. The 970 can handle up to 32GB of 1,866MHz DDR3 (or 2133MHz overlocked) across four slots – we used 16GB of 2,400MHz Kingston HyperX RAM in testing. You also get dual PCIe x16 slots that can support two-way CrossFire, though the AMD 970 chipset doesn't support Nvidia's SLI multi-card tech at all. The 970 has six SATA 6Gbps ports running via the AMD SB950 chipset.

You only get four USB 3.0 ports (two front, two back) but you do get another six front and eight rear USB 2.0 connections. The board layout is generally good, with plenty of space around the socket for large coolers, but if you run dual video cards access to some of the edge mounted connectors gets a little tight and the 8-pin power socket is very hard to unlatch.

MSI's Click BIOS 4 is well laid out and easy to navigate, but as you would expect, not quite as well polished or featured as the super high end boards. The 970 Gaming comes with MSI's OC Genie II (though no hardware button) and is a solid choice for getting into overclocking on the cheap. Letting the OC Genie do the work we got a relatively modest 4.2GHz overclock, while if we dialled it in ourselves we could maintain 4.4GHz on air cooling. The FX8350 is a power hungry beast when overclocked, but speeds up to 4.8GHz are possible with water cooling.

We tested with a Radeon 270X and while gaming performance was already excellent, even a mild overclock can net you noticeable performance gains. SATA access speeds were better than expected (we tested with a Samsung 850 Pro 256GB SSD) and should easily push your SSD to its limits.

The MSI 970 Gaming has a few extra bells and whistles, such as RAMDISK, which lets you use part of your 32GB of RAM as a drive 20x faster than an SSD. You also get what MSI call a Gaming Device Port, which has gold plated USB ports (plus an old school PS/2 socket) to make sure your mouse and keyboard have the best connection.

The Creative Sound Blaster Cinema2 audio (powered by the Realtek ALC1150 chipset) is not bad considering the price range; it features gold plated connectors, EMI protection and an isolated circuit board design. The MSI 970 uses the Killer NIC E2205 LAN controller to provide Gigabit Ethernet as well as manage your packets to help reduce lag when doing things like simultaneously gaming and downloading. The MSI software package is fairly comprehensive, with Live Update 6 to keep your BIOS and drivers up to date and Command Center to tweak and tune your board.

Lindsay Handmer

LABS: BENCHMARKS

BENCHMARK	SCORE
PC MARK 8	4556
PC MARK 8 (OC TO 4.4GHZ)	4701
3DMARK	
ICE STORM UNLIMITED	116328
CLOUD GATE	18690
FIRE STRIKE	5863
FIRE STRIKE EXTREME	2981
3DMARK (OC TO 4.4GHZ)	
ICE STORM UNLIMITED	117521
CLOUD GATE	19023
FIRE STRIKE	6159
FIRE STRIKE EXTREME	3014
ENCODING	
CINEBENCH R15 CPU	689
CINEBENCH R15 CPU (OC)	750
X264 5.01 PASS 1	63.5
X264 5.01 PASS 2	13.9
X264 5.01 PASS 1 (OC)	69.8
X264 5.01 PASS 2 (OC)	14.6
GAMING (FPS)	
COMPANY OF HEROES 2 (1080P)	58.3
- OVERCLOCKED TO 4.4 GHZ	61.8
STORAGE (MB/S)	
AS SSD - SUSTAINED READ	511
AS SSD - SUSTAINED WRITE	488

Verdict

Features ★★★½☆
Performance ★★★½☆
Value ★★★★☆

An affordable yet versatile board with plenty of scope for high end performance and overclocking.

★★★½☆

ROUTER

$320 | WWW.ASUS.COM/AU

ASUS DSL-AC68U

An enthusiast router with ADSL *and* 802.11ac support? Sign me up!

Piggy-backing on open-source router firmware movements like DD-WRT, over the past half a decade ASUS has built up a very good reputation when it comes to making routers. The company's ASUSWRT firmware, for example, goes above and beyond the feature-sets and tweakability of what you'll find in competitors. But on top of that, ASUS has added-in cloud features running on the company's own web services, meaning you don't have to sign-up with third-parties to get elements like dynamic DNS.

The end result, as evidenced by this DSL-AC68U, is a device that can tackle just about any enthusiast networking need you can imagine. It's got all the high-end networking specs an ADSL router should: 802.11ac Wi-Fi at up to 1300Mbps, four Gigabit Ethernet ports, removable antennas and even support for 3G/4G fallback if you plug in a USB modem. But the DSL-AC68U can also adequately fill-in for other networking devices: buy one of these and you may not even need a separate NAS box, for example. By plugging in a USB drive you're not just set up with a network drive, for example, but one that has a built-in downloader and can handle usenet, BitTorrent, web and FTP transfers. It has Apple Time Machine support, can perform health-scans of plugged-in drives and alert you of problems, and gives you easy web access to any files via ASUS's built-in dynamic DNS service. And configuring and setting up all these features is generally simple thanks to a well-presented web interface, which has a nicely-visual main status page that lets you see at a glance what's happening with the router and whether anything needs your attention.

Wireless performance is likewise very solid. We performed 2.4GHz and 5GHz tests are three distances; it was very quick at close range, with good (but not quite class-leading) speeds in our medium and long distance tests, which are physically around 7m and 12m respectively.

> "The DSL-AC68U does a great job of integrating enthusiast-pleasing features with respectable performance and friendly usability."

Could the DSL-AC68U be better in some areas? Certainly. The parental filtering features are only basic – we'd still recommend Netgear as the best option for that. The ADSL sync speeds were conservative, managing 16.8Mbps where competitor's routers have managed 17.7Mbps on the same line. And the fact that there's only one USB port means you can't use both 3G/4G fallback and NAS features at the same time.

Taken as a whole though, the DSL-AC68U does a great job of integrating enthusiast-pleasing features with respectable performance and friendly usability. This is a great one for demanding home networkers who can use the extra features.

Dan Gardiner

Verdict

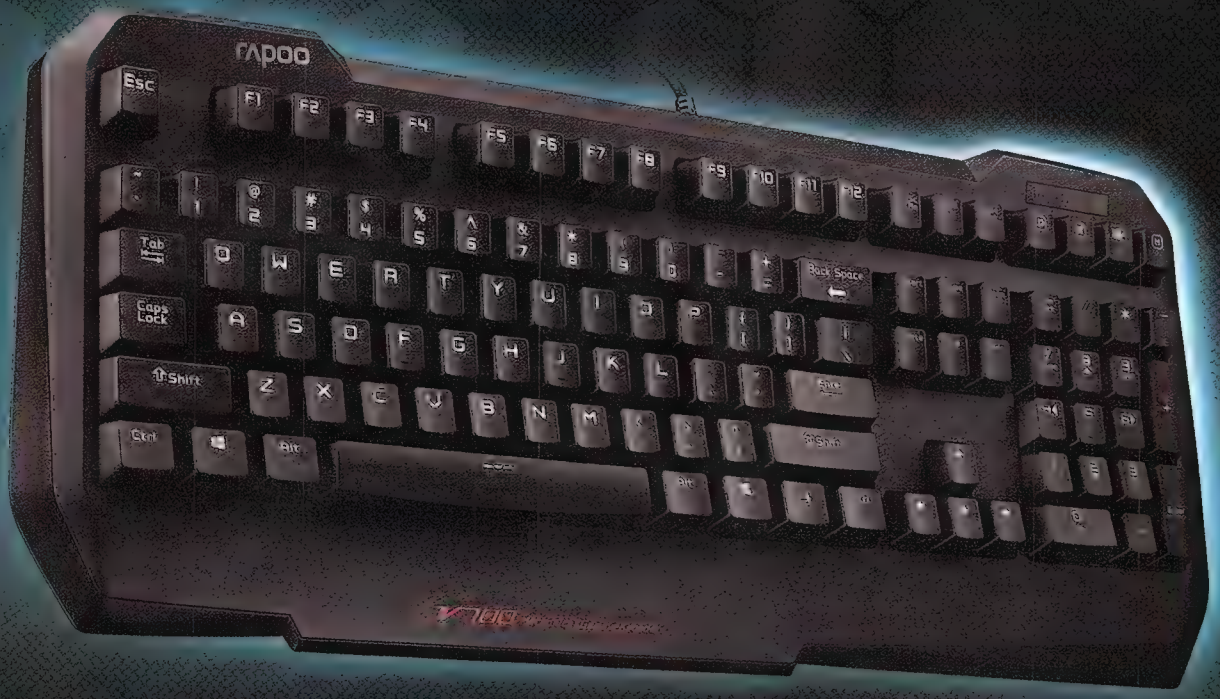
Features	★★★★½
Performance	★★★★½
Value	★★★★

It's more expensive than most, but if you can use the extra enthusiast features the DSL-AC68U is well worth it.

★★★★½

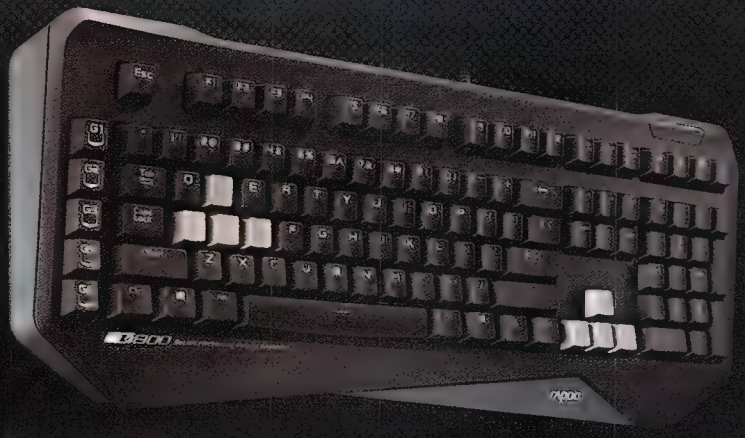
VPRO

Prol Gaming Peripheral Series



V700

Mechanical Gaming Keyboard



V800

Backlit Mechanical Gaming Keyboard

V500

Mechanical Gaming Keyboard

Born for Gaming !

RAPOO Keyboard V-series

Powered by rapoo

SSD

$199 | WWW.AMD.COM

AMD Radeon R7 240GB

The CPU and GPU maker expands into SSDs.

The market for solid-state storage has gotten pretty crowded, and most SSDs can use up all available bandwidth on the SATA III bus. With SATA Express and M.2 devices emerging, the transition away from older, slower technology is in full swing. Despite this, AMD is expanding its Radeon brand from video cards and RAM sticks to SSDs. But the R7 is not the company's own tech, so its investment is much lower than usual.

This line (available in 120GB, 240GB, and 480GB sizes) is the product of OCZ Storage Technology, which Toshiba bought this year. The unit is very similar to OCZ's Vector 150, but with a lower-clocked Barefoot 3 controller chip, and a more up-to-date set of NAND memory. The Radeon SSD also has a four-year warranty, one more than standard. Like the Vector 150, it has hardware-accelerated 256-bit AES encryption and ships with a 3.5-inch drive bay adapter and download code for Acronis True Image HD, a popular tool for creating backups and managing drive partitions.

Looking at performance, we see results similar to the OCZ Vertex 460, which also uses the Barefoot 3 controller. Neither drive fully saturated the SATA III bus in our tests, but the R7 SSD also fares oddly in the ATTO benchmark. At the 64KB file size, it's reading and writing at about 400MB/s. We usually see numbers closer to 500MB/s. At the 128KB tier and above, the drive shoots up to the normal range of 525–550MB/s. If you're moving a lot of image files, the performance gap will become apparent.

But as a boot drive, the sheer access time of SSD technology matters more, and the Radeon R7 does fine there. Plus it's possible to fix some performance quirks with a firmware update. You'll be able to use the OCZ Toolbox software for updates and secure erases. While it doesn't come with the drive, you can download it from OCZ directly.

MONEY MATTERS

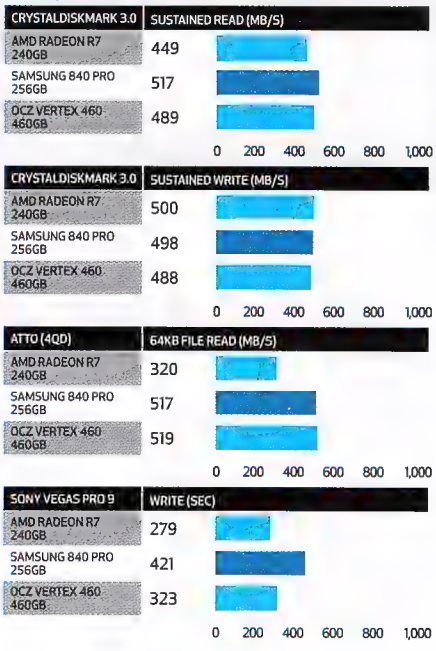
Transfer speeds aren't as high as we'd hoped, given the $200 price. OCZ's Vertex 460 has a street price of $185 and also bundles True Image HD, though its warranty is only three years. Then there's the Crucial MX100 256GB, a popular competitor at $150. So a lot of the R7's appeal will depend on how much lower that price drops, and how much you want True Image HD. Since 2012's original Vector, OCZ hasn't been known for aggressive pricing, but new ownership and a collaboration with AMD could spell change.

We're more confident about its warranty — although it's a little disappointing we miss out on "ShieldPlus" support in Australia, which is only available in the US and EU. Should the drive die, this lets you use the unit's serial number to get a a brand-new replacement. OCZ provides shipping labels and even ships a new SSD before it's received your old one. OCZ and AMD are clearly eager to please and if they can bring this to Australia, it could increase their appeal in a saturated market. Intel has shown that people are willing to pay a premium for high-quality SSDs. The ball's in your court, AMD. ■

LABS BENCHMARK RESULTS

All tests are conducted on a Gigabyte Z77X-UP4 motherboard with Intel Core i5-3470 3.2GHz CPU, 8GB of RAM, Intel 520 Series SSD, and a Cooler Master 450W PSU.

Disk speed tests



Verdict

Features	★★★½
Performance	★★★½
Value	★★★

Very good performance; high-grade support. But a difficult price point and no ShieldPlus warranty dulls the appeal.

★★★½

$55 | WWW.GAMDIAS.COM

Gamdias HEBE

Surprisingly good virtual surround sound for next to nothing.

The philosophy behind this headset is simplicity – all the fundamentals ticked off, all the fussy bits chucked out. It's a manifesto we can get behind. So, despite the product resembling something you'd find at the bottom of your goodie bag after visiting Ferrari World, it works.

First and foremost, the Hebe is about sound quality. For the rock-bottom price, the headset is frighteningly good. Sound reproduction is really crisp and makes it easy to pinpoint the source. It's one of the best we've heard in this price bracket. There's also little to gripe about elsewhere. The lengthy braided cable with its inline remote is welcome. Often, headsets in the $100+ range omit braiding, so it's great to see it in the bargain basement. The microphone isn't really up to voiceover tracks if you're a Twitch streamer though. But, the Hebe is good enough for gaming sessions and the noise-cancelling works pretty well. The headset doesn't feel comfortable at first, and we're not fans of the plasticky faux-leather, but after long usage periods it doesn't dig in or feel heavy. Build quality is in-line with other headsets at this price, a bit above it too. However, it looks awful. Bright red? Really? Since aesthetics are subjective, it's not right to mark the headset down based looks. But, y'know... bright red. So there you have it. If your pricey headset died and you need a cheap replacement: here's your guy. If you don't have much to spend in the first place: bingo. Spending more will get you nicer materials, but it certainly won't buy you significantly better sound quality

■ Phil Iwaniuk

Verdict

This headset packs solid sound quality without stripping anything you'll miss.

★★★★½

$129 | WWW.KINGSTON.COM

Kingston HyperX Cloud

Great sound and comfort.

When we first saw Kingston's HyperX-branded headset there was a twang of recognition in our collective hivemind tech lobes. It is effectively QPad's excellent QH-90 headset but with a little bit of a paint job. Then there was an immediate shudder as we heard that Kingston had taken one of our favourite headsets and decided that it needed bigger 'splodes. Yup, Kingston has turned up the dial on the bass.

To our surprise, it hasn't taken anything away from the original headset's aural quality. Our one concern with the QH-90 was that the bass response was a little light because of the delightfully balanced EQ that QPad had used.

Kingston has augmented the low-end of this HyperX version to give the sub-20Hz frequencies a punch that is more felt than heard. It's not punching your ear like the Mad Catz cans, but adds depth to the bass notes without muddying other sounds.

And because it's practically identical to the QH-90 set, it's got an elegant, robust and lightweight design that feels comfy after long periods of use, and the detachable mic is as clear as you could want.

Incredibly, Kingston has improved on an already impressive headset. ■

Verdict

Kingston has taken a good set of cans and made them great.

★★★★★

GAMING MOUSE

$99 | WWW.AORUS.COM

Aorus Thunder M7

Can Aorus' first gaming mouse stand out from the established players?

There's something pleasingly chunky about Aorus' first gaming mouse, the Thunder M7. This MMO-centric, multi-buttoned mouse rides high off the desk and fits more comfortably in your hand than you might expect.

Having spent a good while gaming with it we've developed a soft spot for it. Where that soft spot gets decidedly rocky, however, is with the main thrust of its overall design – those MMO-lovin' buttons. 8,200dpi is a good indication it's based on the Avago ADNS-9800 sensor and that's no bad thing. You wouldn't generally be using it at the top sensitivity, but you could argue that today's high-res desktops benefit from a little speedier mouse movement. Aorus' Macro Engine software offers all the tweaks you'd expect. There are five profiles to fill with your choice of macros and whatever bizarre button configurations you want. The macro recorder is simple to use and pretty effective, and the key mapping is quick to operate, with visual indicators as to which of the nine buttons you're messing with. Those buttons are very tightly-packed, which means figuring out which one you're slapping your thumb against can be a bit of trial and error. Thankfully, they're not as cramped as they are on the strangely popular Razer Naga. There's somewhere for us claw-grip gamers to rest our thumbs too, with a little Braille-like nodule on one of the central buttons to help. We'd love to see this chunky little rodent with just two programmable buttons next to the left mouse button, instead of the current mostly-useless MMO clump. ■ **Dave James**

Verdict

A decent, chunky and accurate gaming mouse, but those MMO-centric buttons are just a little too tightly packed for us.

★★★★

GAMING MOUSE

$70 | WWW.RAPOO.COM

Rapoo V900

The Chinese peripheral maker ventures into the PC gaming space.

The V900 isn't quite the slickest looking gaming mouse we've seen – in fact, it'd be fair to say that its mix of glossy and matte plastic combined with textured rubber sides is a bit of a hodge-podge.

On the other hand, what a mouse looks like doesn't really matter compared to what it feels like in the hand, and in the latter area there's few better. This is a very solid physical design with a high degree of symmetry – there's a gentle hourglass shape to the V900, with textured rubber grooves that run diagonally down the sides that provide comfortable resting places for your thumb and ring finger – that's great for claw-grip mousers, but the main body's also still big enough that it should please palm grippers as well. Also worth praise are the nice big thumb buttons and a wide and comfortably-rubbery scroll wheel. For its fairly keen $70 price tag the V900 packs some surprisingly high-end features: an adjustable 8200dpi laser sensor, custom RGB LED lights, inbuilt memory for remembering your sensitivity and lighting settings (even without the drivers installed). And the performance in use was hard to fault – this is a mouse than can comfortably be used at ultra-high sensitivity or right down low (as preferred) with excellent stability and precision. Even the configuration software is surprisingly polished. In short, with the V900, Rapoo's got a bit of kit that can play up against the Logitechs' and Razers' of the gaming-mouse world. If you're in the market, this is well worth a look. ■ **Dan Gardiner**

Verdict

A great first gaming mouse from a relatively unknown name, this one definitely deserves attention.

★★★★½

SMARTPHONE

$269 | WWW.MOTOROLA.COM.AU

Motorola Moto G

How much value can you squeeze into 5-inches of smartphone?

The newly-refreshed (but still priced economically) 2014 edition of the Moto G isn't really that different from the Moto G 4G model from earlier this year – the key differences are a bump up in screen size (from 4.5-inches to 5-inches) and the fact that this unit's gone back to the original Moto G's dual-SIM 3G arrangement; you only get HSDPA+ speeds, not 4G.

Otherwise the internals are largely the same – a 1.2GHz Snapdragon 400 processor married to an Adreno 305 GPU with 8GB of storage, 1GB of RAM and a 720p LCD display; enough to do all the basics and make this one a reliable performer. Flagship smartphones from Sony, Samsung and LG are typically about twice this speed in CPU and four or five times faster for gaming grunt – but they're also three or four times the price. The Moto G definitely feels more expensive than it is – and not only physically, but from both a performance and OS usability standpoint too. Despite the lower-end hardware, it's generally fast to unlock the phone, fire up the camera or launch apps and games, with only a little bit of lag here and there (most notably when returning back to the Home screen).

It isn't perfect, then, and Motorola's also deliberately held some software features back (like the ability to customise the quick settings buttons in the notifications area, or Active Display which shows notifications on the screen) for its higher-end Moto X. In short, though it may be priced like a featherweight, the new Moto G's got a punch that can take down opponents at twice its price. Definitely a contender. ■ Dan Gardiner

Verdict

It may have a budget price, but this is one of the best-balanced Android smartphones currently available.

GAMING MOUSE

$50 | WWW.THERMALTAKE.COM

Thermaltake Ventus

Sweaty palms begone!

As the name suggests, Thermaltake's latest gaming mouse is all about venting – and no, we don't mean in the anger sense.

Designed to help the inevitable sweaty palms that many people experience while mousing (hey, we're not judging), the Ventus incorporates a honeycomb grid of hexagonal holes on its back, which opens up to a small airy cavity underneath. The idea is that, as you mouse around, this open design will help aerate your palm and keep it dry. (This is a mouse for palm-style grippers then – those who like to rest their palm on the hump of a mouse's back.) And in practice it does work – kind of. There's still some plastic under your palm so some heat build-up is inevitable, and keeping an adequate amount of airflow through the cavity does mean making biggish mouse movements, so if you prefer twitchy, high DPI sensitivity you're not going to get the best effect. Thankfully, the Ventus doesn't just rely on that cooling gimmick to sell itself – it's actually a damn good gaming mouse too, with adjustable weight, on-the-fly DPI switching, a braided cord with velcro strap and a comfortable matte-black plastic coating. The left and right buttons are also generously wide, with a sturdy and clean clicking action. We'd perhaps like to see a version with a mini-fan mounted under the vent holes, but that gripe aside, this is both a unique and pleasing design. ■ Dan Gardiner

Verdict

The weird design isn't for everyone, but it works adequately – and the mousing itself is solid too.

The smart choice in SSDs

Samsung's EVO family of solid-state drives offer the most compelling mix of performance, price and capacity on the market.

SSDs have transitioned from niche products made for enthusiasts and professionals to something that every PC should have. As SSDs have aptly proved, traditional platter-based hard drives can be a huge bottleneck when it comes to performance, with today's SSDs offering up to five times the speed when it comes to reading and writing data — and many times that in more seek-intensive tasks, like the random reads and writes that make up most of our day-to-day computing tasks. In short, if you want a computer that not only boots up and loads apps quickly, but is also incredibly responsive, then an SSD upgrade is a must.

So which SSDs are the best-value proposition in today's market? There's a lot of competition from SSD makers (both big and small), but of all those, Samsung's EVO line of drives has the most persuasive range of products. If you need a big SSD, Samsung's EVO range features the largest consumer drives available, with models ranging up to a whopping 1TB.

Feeling the need for speed? The EVOs consistently perform on-par with — and often better than — more-expensive drives from other SSD manufacturers. And that potent mix of capacity and speed isn't going to cost you an arm and a leg either — the EVOs are some of the best-value SSDs available and they can be scooped up for less than $1 a gig.

EVO drives also include exclusive technologies, such as Samsung's Magician software, which can make it easy to transition your PC or laptop from your old drive to your new EVO SSD. Magician also includes the innovative RAPID Mode, which detects frequently-used data and caches it to DRAM. This not only helps improve performance, but can reduce wear and tear on the SSD itself.

Samsung is an undisputed expert when it comes to flash storage. Its chips don't just end up in its own devices (including its popular Galaxy smartphones), but even in products from its major competitors. It's this level of integration that helps Samsung put together the most compelling SSDs currently available. Whether you're looking for an inexpensive way to upgrade your laptop's hard drive to turn it into a lightning-fast portable PC, or putting together the plans to build your next killer gaming rig, Samsung's EVO line up is the smart choice when it comes to SSDs.

The 840 EVO at a glance

Capacity
Up to 1TB (1TB = 1 trillion bytes)
Form Factor
2.5-inch
Interface
SATA 6Gb/s (Compatible with SATA 3Gb/s & SATA 1.5Gb/s)
Dimension (WxHxD)
100 x 69.85 x 6.80mm
Weight
Max 53g
Storage Memory
Samsung 19 nm Toggle DDR 2.0 NAND Flash Memory
Controller
Samsung 3-core MEX Controller
Cache Memory
Samsung 1GB Low Power DDR2 SDRAM
Application
Desktop PC & Laptop PC

SAMSUNG

Samsung Super-speed Drive

Samsung SSD 840 PRO

Samsung SSD 840 PRO with RAPID mode technology

Samsung's fastest and most powerful SSD range yet with RAPID mode technology. A distinguished level of Samsung performance available to anyone. Visit **www.samsung.com/ssd for more information**

software

» APPS FOR ALL THE PLATFORMS BY PETER DOCKRILL

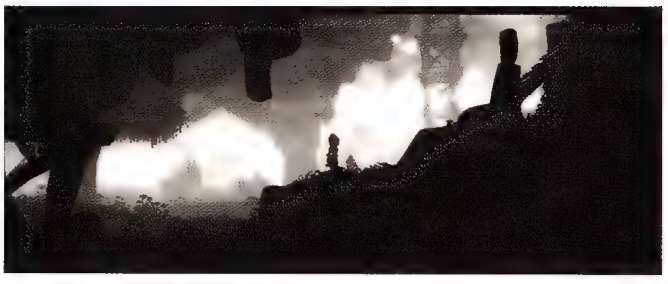
Windows SOFTWARE

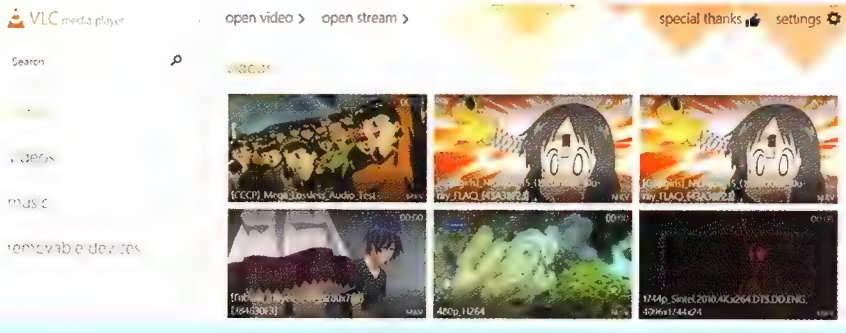
Project Spark

Microsoft's ambitious plan to turn gamers into creators.

FREE | MICROSOFT | TINYURL.COM/MC9FNX9

A massive Microsoft undertaking that's been in the works for years, *Project Spark* is more than just a game — although it does let you play games, 'hundreds of thousands' of them, according to the company. Rather it's a game-playing system coupled with a full 3D game-making studio, for Windows 8.1 and Xbox One, aimed at total beginners who are happy to learn how to design their own games by playing, stepping through tutorials and sampling others' creations. In a sense, *Project Spark's* broadness of vision and scale is reminiscent of the *Disney Infinity* ecosystem, although it looks to be capable of creating significantly more complex and sophisticated games and game worlds than Disney's kid-centric sandbox. Also like *Disney Infinity* it's designed to nickel and dime you, with a cornucopia of themes and expansion packs available via IAP. Still, if you've got an idea for a game but don't want to have to learn how to actually code in order to realise it — or you just want to experience what others have been experimenting with — *Project Spark* is a significant creative tool (and quite literally a game-changer).





VLC for Windows 8

FREE | VIDEOLAN | TINYURL.COM/O5AV8WC

VLC, also known by its former name VideoLAN Client, is a venerable open-source media player that's been around for many years: an essential, multi-platform entertainment app that we'd recommend to any PC user. Windows users have long been well-served by the free desktop version available at **www.videolan.org**, but in recent times VideoLAN have busied themselves bringing VLC to mobile platforms, releasing ports for iOS, Android and more recently Windows 8/RT. VLC for Windows 8, which despite its name has been fully updated to support Windows 8.1, lets you enjoy video and audio files in a wide range of formats including MKV, Ogg and FLAC, both from your onboard library or via external devices and media servers. There's an awful lot of shovelware on the Windows app store that wants to charge you for this exact kind of functionality — and worse, some of them even purloin 'VLC' and stick it in their own name in order to confuse users into coughing up. The only VLC you should use is free and most likely always will be (make sure VideoLAN is the publisher).

Firefox Hello

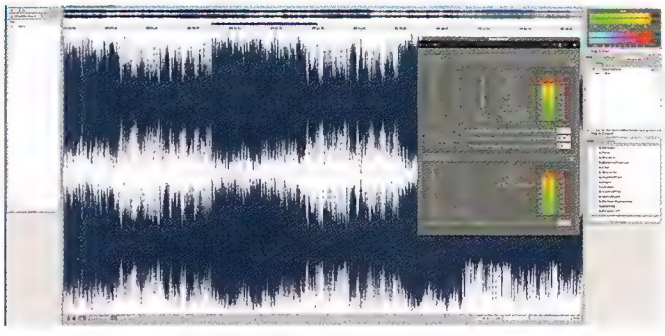
FREE | MOZILLA | TINYURL.COM/7BAKRH8

It wasn't all that long ago that video chatting was considered a shiny new innovation, but one of the limitations of the technology thus far is users have always had to ensure they're running the same chat software in order to facilitate the call (eg. Skype, FaceTime etc.). But if Mozilla has its way, video chat could be as simple and frictionless as sharing one web link over email or messaging. Powered by WebRTC, Firefox's new Hello feature lets users make free voice and video calls directly from their browser, with no accounts, sign-up or hassle — and it's intended to be fully inter-operable between Chrome and Opera users too (or any other browser that supports WebRTC). At time of writing Firefox Hello was only available in the Firefox Beta, but by the time you read this it should have found a home in the standard release.

Sound Forge 2

Sony's famous audio app, now on the Mac App Store.

$129.99 | SONY CREATIVE SOFTWARE | HTTPS://ITUNES.APPLE.COM/AU/APP/SOUND-FORGE-2/ID890610817?MT=12

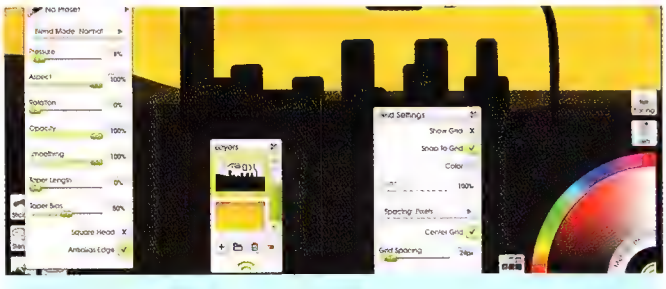


If you work with audio files you may know Sound Forge already: it's a waveform editor that enables you to record, edit, fix and output audio in a variety of formats. You can use it to edit samples and performances, or to master finished tracks from digital audio workstations such as Logic Pro X. Sound Forge 2 is a lighter version of Sound Forge Pro Mac 2; and it's sold for half the price.

Getting the price down means this version doesn't have the Convrt batch processing tool, the loudness meters or the iZotope Mastering Effects Bundle. It also lacks some of the Pro edition's audio repair tools including Declicker, Denoiser and Declipper. However, it provides the same engine and key editing tools as its more expensive sibling, includes the Wave Hammer compressor and supports 64-bit Audio Unit (AU) and VST plug-ins.

While it can work on multiple files and record up to 32 audio inputs, it isn't designed for Logic or Garageband-style composition, doesn't do MIDI and doesn't include CD burning, and while it offers SMPTE timings, you can't open video files and edit the audio tracks. What this is is a blindingly quick program that can combine audio from multiple tracks, eradicate imperfections and produce pristine files suitable for broadcast or use in other applications. Sound Forge is a non-destructive editor, which means it doesn't process the file until you tell it to: the effects chains and edits you set up are a series of instructions which remain editable. Editing can be region-based or event-based, with the latter making it easy to make huge changes to waveforms: when you move an event to another part of the timeline, anything you've applied to that event moves too.

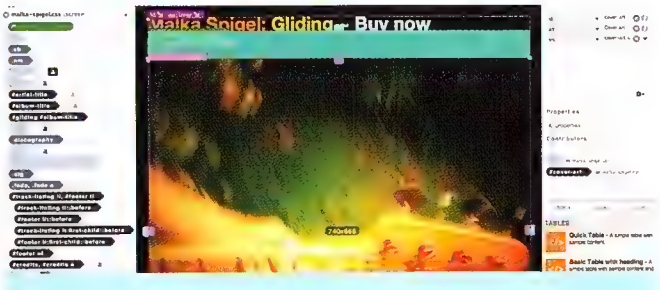
You can apply effects or redraw waveforms to remove clicks, pops or coughs; move sections around, time-stretch or pitch-shift them; add cross-fades or insert silence; and, using Wave Hammer, add a range of compression effects. It's hard to envisage an audio problem that Sound Forge can't fix. The interface isn't the most user-friendly, CD burning is an odd omission and the missing cleanup tools mean that for fixing poor-quality audio you'd be better off with the Pro version. However, Sound Forge's speed and price tag more than compensate.



ArtRage 4.5

US$50 | AMBIENT DESIGN | WWW.ARTRAGE.COM

A consumer-oriented app for working with natural media (pens, paints etc) from the safety of your Mac's display. The interface is friendly, if esoteric; it is simple to select tools, pick colours and update settings. The tools are broadly impressive. We especially enjoyed messing about with ink pens, the paint roller, and oils. The new grid overlay is also useful. Add it to your canvas and your scribbles are supposed to align to the grid. It's not perfect. Often, the line snaps to a parallel one, and the means to lock your direction is missed. However, the tool has its uses. Pinned reference images also get a grid, which is great for upscaling, and customisable ink pen smoothing makes the grid handy for lettering.



Flux V

US$109 | THE ESCAPERS | WWW.THEESCAPERS.COM/FLUX

Flux aims to give you the means to create web sites, regardless of your approach or level of expertise. You can drag and drop components onto a canvas and resize elements live; alternatively, you can delve into code, fine-tuning property values and the element type of a selection. Projects can be started from scratch, imported or based around built-in templates. This update is a multi-threaded rewrite for Mavericks and seems faster than before. In use, there's lots going on, and the lack of hand-holding means Flux isn't great for newcomers, who'd be better off with the likes of Tumblr or RapidWeaver. But if you know your way around some code, Flux is a more interesting prospect.

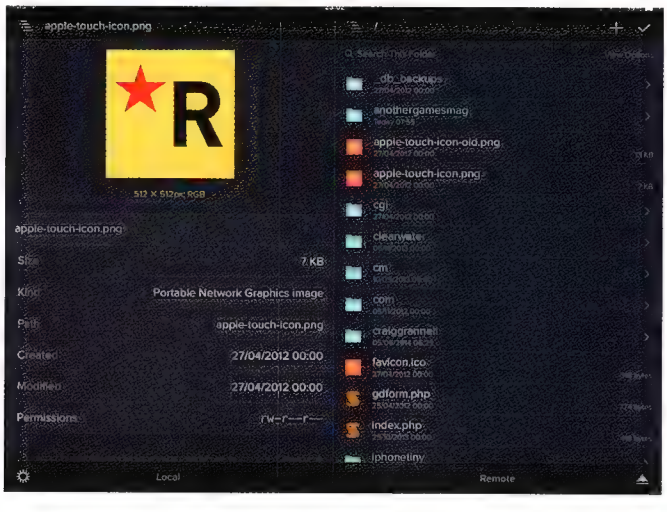
Panic Transmit iOS

The quintessential OS X file-transfer app comes to iPhone and iPad.

$12.99 | PANIC INC. | PANIC.COM/TRANSMIT-IOS

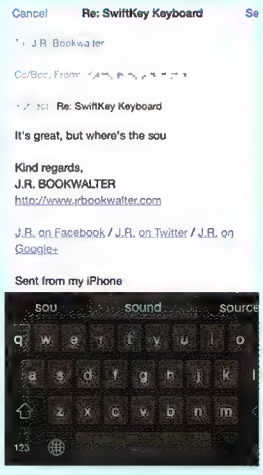
The first thing that strikes you about Transmit iOS is how great it looks – and that's a bit of a weird thing to say about a file-transfer app. But this isn't a case of adding unnecessary bling to a traditionally workmanlike product – instead, it illustrates how great design can transform an app.

Transmit iOS of course still does the basic things you'd expect: you can access remote servers (FTP, SFTP, WebDAV, Amazon S3, DreamObjects), transfer files between local and remote sources, manage file locations, and make adjustments to permissions. There's also basic text editing. But Transmit iOS takes things further than its iOS contemporaries, and even gives desktop apps plenty to think about. From a visual standpoint, Transmit iOS is gorgeous – all dark backgrounds, colourful document icons and stripped-back interface. But this isn't just for show. Throughout, intelligent use of colour and design adds clarity and makes it easy to zero in on certain file types. From an interaction perspective, Transmit makes use of drag-and-drop, so it's simple to organise files into folders (which can be compressed); on an iPad or iPhone 6 Plus in landscape, there's a traditional two-pane view, but you can drag between sources on smaller displays as well, thanks to clever dropzones that pop up at the foot of the screen. Compatibility with OS X Remote Login enables local Mac file access, Touch ID or a PIN secures everything, and support for iOS 8's Document Picker enables you to grab files from pretty much anywhere. This is best-of-breed, by some margin.



Swiftkey for iOS

FREE WITH IAP | TOUCHTYPE LTD. | SWIFTKEY.COM



With iOS 8, Apple has finally delivered the holy grail of customisation: third-party keyboards. SwiftKey can be used as an alternative to the stock keyboard. For best results, you're asked to surrender a bit of privacy by enabling SwiftKey Cloud, which taps into contact data and typing habits learned from Facebook, Twitter, Evernote, or Gmail accounts to create personalised results. Like the iOS 8 keyboard's QuickType feature, SwiftKey displays a trio of predictions as a user types. On iPhone and iPod touch only, SwiftKey Flow can optionally be used to type by swiping across the keyboard from one letter to another, a core feature of SwiftKey's competitor Swype. We found both methods worked equally well here, and SwiftKey addresses one of our longstanding complaints by displaying lower-case letters, which the default keyboard lacks. While the core app is free, at launch SwiftKey offers only two themes, with others planned as in-app purchases.

OmniFocus 2 for iPad

$29.99 | THE OMNI GROUP | OMNIGROUP.COM

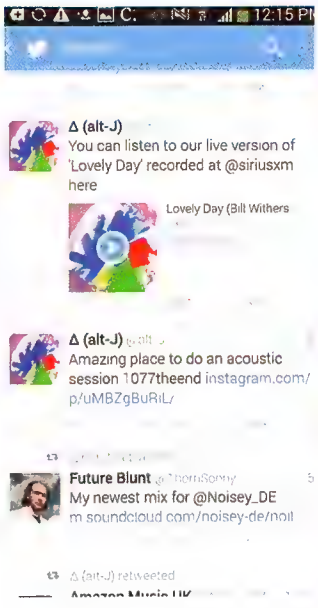
OmniFocus 2 is a big change, finally giving this task manager a modern iOS design. An overhauled split-pane menu clearly presents the organisational principles of Getting Things Done. The Forecast button shows due tasks for the coming week, broken down by day; tapping it lists tasks and Calendar events on the right. Inbox houses unsorted tasks, while Flagged items get their own list and Nearby shows actions tied to locations, on a map. Projects is where actions assigned to a larger goal appear as nested lists, while Context lists tasks sorted under whatever it is you need to finish an action (a particular person, perhaps). Perspectives allow you to list tasks based on specific information (tasks completed, for example). Each list type has checkboxes that usefully change colour depending on their due date. Tapping a task shows its edit window to set context, project, due date or deferral, with a share-by-email option and tabs for notes and attachments. New tasks can be input at any time using an ever-present menu bar that includes search, view and undo options. OmniFocus 2 brings background sync, Reminders integration and a useful Notification Centre widget for iOS 8 users.

Twitter

Twitter makes a second stab at integrating audio.

FREE | TWITTER | TINYURL.COM/N2ZMQP6

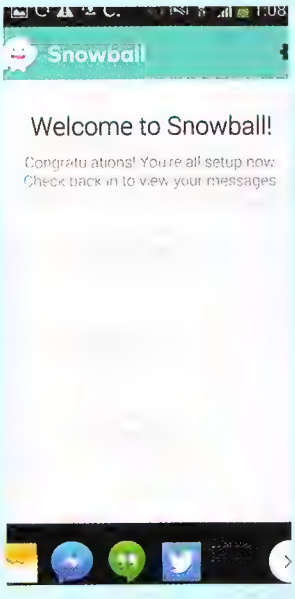
As far as social apps go, Twitter is in just about the most enviable position any startup could hope to occupy. Like Facebook before it, the service now enjoys household name status pretty much everywhere, and it's widely used by celebrities, artists and the media industry at large, giving it virtually endless promo opportunities by proxy. The problem it's facing, however, is in building its user base to include the so-far-not-really-tweeting mainstream, and one of the ways it's doing this is by building new content functionalities on top of its core messaging feature. Twitter already experimented with music a year or two back with the ill-fated Twitter Music – a separate, somewhat unwieldy app that never really took off – but now the company is back with a more integrated approach. With Twitter Audio Cards, you can now listen to embedded music and sounds directly in the Twitter app, via a collaboration with SoundCloud. Only select Twitter users


Δ (alt-J)
You can listen to our live version of 'Lovely Day' recorded at @siriusxm here
Lovely Day (Bill Withers
Δ (alt-J)
Amazing place to do an acoustic session 1077theend instagram.com/p/uMBZgBuRiL/
Future Blunt
My newest mix for @Noisey_DE
m.soundcloud.com/noisey-de/noil

can upload content at present while the feature is in beta (acts like Coldplay, Alt-J and David Guetta are among the initial rollout). Leaving the app nixes the audio (boo!) but for Twitter users who already use the service to follow their favourite artists, embedded music must seem long overdue, and at least it's a step in the right direction.

Snowball Beta

FREE | SQUANDA | TINYURL.COM/N2ZMQP6



Snowball's not the first app to try to become your one-stop-shop for social messages, but its 'unified inbox' approach for all your accounts certainly bears promise. The idea is simple: if you enable your social messaging accounts — including Facebook Messenger, WhatsApp, Snapchat, Google Hangouts, Twitter and SMS too, plus others — for Snowball, you can see all your messages in one single place. You're notified that a new message has arrived when a "Chat Head" style snowball appears on your screen. Tap the snowball and you can see your new messages, with replying bringing up the relevant app (eg. Facebook Messenger if it's a Facebook message). Cute and convenient — but of course it means downloading yet another social app...

Androidify

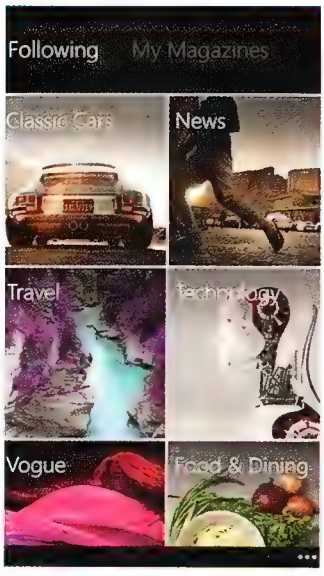
FREE | GOOGLE | TINYURL.COM/PLEV8NX

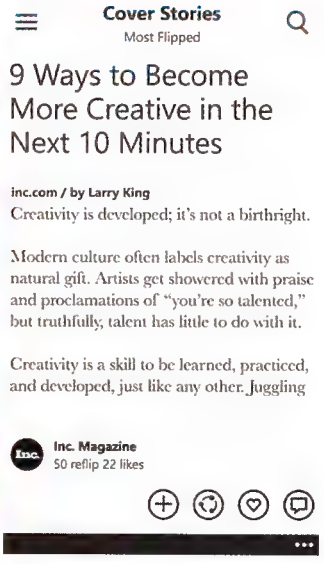
Given that Android has pretty much conquered the globe now, it's fair to say that its cute little green mascot is probably one of the world's most recognisable cartoon characters. And with Androidify you can customise the tubular little fellow any which way you like to become your own personalised Android avatar. You've got full control over skin colour, clothing, footwear, hairstyle, facial hear, glasses, accessories, props and more. Once you're done, you can share your creation as a PNG, GIF or emoticon, with Google even offering the chance to have your Android featured on upcoming TV commercials and YouTube videos. Pretty much the definition of app frippery, but a harmless bit of fun. A nice app for kids and a cool way for Android users to personalise their accounts.

Flipboard

Flipboard comes to Windows Phone, sans the flipping.

FREE | FLIPBOARD | TINYURL.COM/PV97693




Cover Stories
Most Flipped
9 Ways to Become More Creative in the Next 10 Minutes
inc.com / by Larry King
Creativity is developed; it's not a birthright.
Modern culture often labels creativity as natural gift. Artists get showered with praise and proclamations of "you're so talented," but truthfully, talent has little to do with it.
Creativity is a skill to be learned, practiced, and developed, just like any other. Juggling
Inc. Magazine
50 reflip 22 likes

We've covered Flipboard many times in these pages, as it's one of our favourite mobile news readers. The app originally rose to prominence as one of the early iPad apps to seize the public's imagination; it did this largely through its aesthetic approach, by using the tablet's display dimensions to mimic the look of a news magazine layout, except one populated purely by your own particular editorial choice of feeds and content, be they topic genres like technology, sport or photography, or dedicated RSS feeds and social network updates. The killer feature of Flipboard that arguably differentiated it from a host of similar news-reading apps was its page-turn animation, which helped cement the look and feel of the whole 'magazine' metaphor.

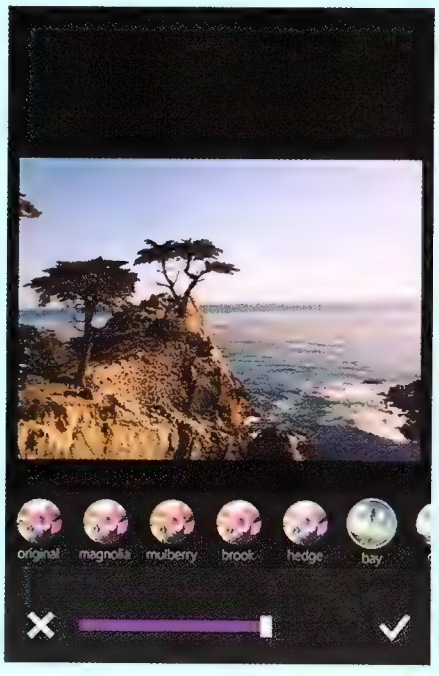
As time passed, Flipboard became available on more mobile platforms, including smartphones (iOS and Android), where the narrower portrait orientation of the displays prompted Flipboard to switch its trademark page-flipping gesture from a natural-feeling horizontal (right to left) to vertical (down to up). In our view, this was only moderately successful, as it dampened the illusion of actual page-turning. And now Flipboard has watered things down again, finally bringing the app to the Windows Phone platform but dispensing with the page-flipping schtick outright. Instead, Windows Phone users merely scroll vertically between a series of largely static story tiles — a ubiquitous but boring design convention that could be lifted out of virtually any other mobile app or web site.

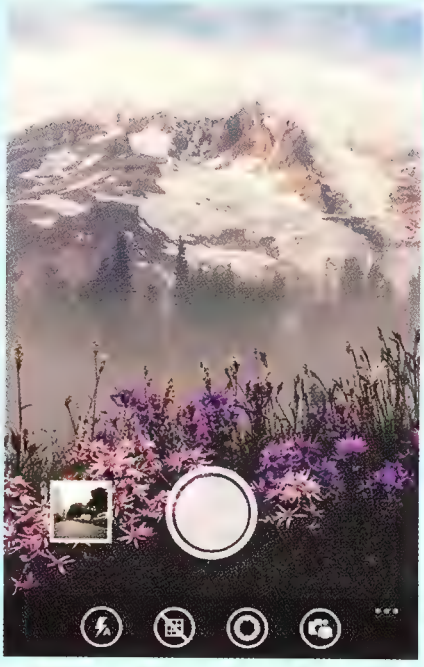
And long-patient Windows Phone users aren't happy about it, with one user on the Australian store complaining: "It doesn't flip!!!! Waited for this so long since the announcement last year and after all this time this is all they can come up with?" It's a rather amusing backlash, really, showing how fickle we as users can be with our apps (this writer included), but with the flipping stripped from Flipboard, it highlights how unremarkable and commonplace most of Flipboard's other features now are, with the reading and social elements now available in a host of other apps, bar one: Flipboard's celebrated make-your-own-magazine feature, which is still a standout if you want to personally curate and republish the best of the web.

Afterlight

99C | AFTERLIGHT COLLECTIVE | TINYURL.COM/P9VYVTS

One of the more celebrated iOS photo-editing apps of recent times has been Afterlight, which has just touched down on Windows Phone (and Android), and while it doesn't seem to yet offer all of the features of the iPhone version it's still a slick, easy-to-use photo editor. After you've taken or uploaded your shot, you've got access to all the regular manual controls you'd expect (brightness, saturation, contrast, temperature and so on) plus a huge number of preset filters to play with — and more available via the inevitable IAPs. You can customise your image with light leak, grain and film effects and apply artistic frames and wallpapers. A free trial is also available (it's only three days, but that ought to be enough to figure out whether Afterlight is for you).





THE ULTIMATE PROTECTION

Antivirus | Antispam | Internet Security | Anti Malware

THE ULTIMATE PROTECTION
Antivirus | Antispam | Internet Security | Anti Malware
SECURALIVE™ INTERNET SECURITY
Home Edition
BLOCKS THREATS NOT PRODUCTIVITY
SECURALIVE™
SECURE AND PROTECT
Blocks viruses, trojans, spyware, rootkits, and other threats without user interruptions or continuous alerts
Blocks phishing attacks, hackers, and online scams
Blocks websites including "http" and "https" sites
Easy management and configuration
Protects all users on the network (wired and wireless)
50 Web content filtering categories
securalive.com
THE ULTIMATE PROTECTION
Antivirus | Antispam | Anti Malware
SECURALIVE™ ANTIVIRUS
Home Edition
BLOCKS THREATS NOT PRODUCTIVITY
SECURALIVE™
SECURE AND PROTECT
Blocks viruses, Trojans, spyware, rootkits, and other threats without user interruptions or continuous alerts
Proactive Protection from known and unknown threats
Blocks phishing attacks, hackers, and online scams
Blocks malicious programs from changing your security settings
Blocks threats generating from a removable device
securalive.com

DOWNLOAD YOUR FREE TRIAL ONLINE

SecuraLive™ Internet Security offers complete protection for in-home and mobile users – including home or office networks, public Wi-Fi hotspots and cellular data networks. It automatically blocks known adult, unsafe, fraudulent, phishing and infected websites from entering your home networks. Just turn it on and you will be protected.

SecuraLive™ Proactive, Real-Time Protection identifies previously unknown malware in realtime. The SecuraLive™ Antivirus System is a single, unified, scanning engine that provides comprehensive protection without compromising speed, stopping zero-day threats as they emerge.

Available for Home, Business and Android Mobile.

ANDROID APP ON Google play

SecuraLive™ Internet Security

- ✔ Blocks viruses, trojans, spyware, rootkits, and other threats without user interruptions or continuous alerts
- ✔ Blocks phishing attacks, hackers and online scams
- ✔ Protects all users on the network (wired and wireless)
- ✔ 50 Web content filtering categories
- ✔ Blocks websites including "http" and "https" sites
- ✔ Easy management and configuration

For more information and reseller enquiries visit us at **www.securalive.com** or call us on **1800 201 202**

SECURALIVE™ SECURE AND PROTECT

Protect yourself

While software makers have gotten better at protecting their products, the bad guys have also gotten better at defeating those protections. Nathan Taylor explains what the threats are and how to avoid them.

There's little question that hardware and software developers have become much better at delivering secure products. Windows vulnerabilities are rarer, most software auto-patches these days and curated app stores can help users steer away from the shonkier sources of apps. But as the software has evolved, so have the net nasties. Mobiles, social networking, traffic direction systems and critical infrastructure have become common targets. Targeted breaches of online databases have been a large theme in the past year – that's not us getting hacked, but the people to whom we trust our data. And we have learnt that we have more than just criminals we have to worry about: governments and business have proven more than willing to snoop on our every online activity.

So what can you do? We've put together a quick list of the major current threats and how to best avoid them.

Windows XP

On April 8, Microsoft called it quits on Windows XP and Office 2003. Even though both still enjoy a significant user base, there will be no more patches or updates for the operating system or office suite. That makes them uniquely vulnerable, and if you're still using XP, it's definitely time to think about upgrading.

Malware

THE PROBLEM

For most users, malware remains the most pressing online threat. The term is short for malicious software, and it covers viruses, worms, Trojans, spyware, ransomware and any other software that exists to ruin your day. A lot of people also use the terms to describe potentially unwanted software (PUP), which is the unwanted and annoying crud like browser toolbars and other adware that so often gets delivered with "free" and sometimes with paid software.

Malware is nearly always installed by the user, typically by executing a script or opening an application that they shouldn't have. Trojan horses account for some 70% of malware infections, and the traditional means of delivering malware is still around: downloads from dodgy sites and social engineering attacks (where the user is tricked into opening a file they shouldn't) are prominent.

The effects of malware vary wildly, but the overwhelming trend in the last few years has been less "destroy everything" and more "let's steal or extort money from the user." According to Sophos' Security Threat Report 2014, we've seen a much greater emphasis on compromising financial records and information, on using infected computers for BitCoin mining, and on ransomware, where the documents on infected computers are encrypted with the promise of decryption only if the user pays a sizeable ransom.

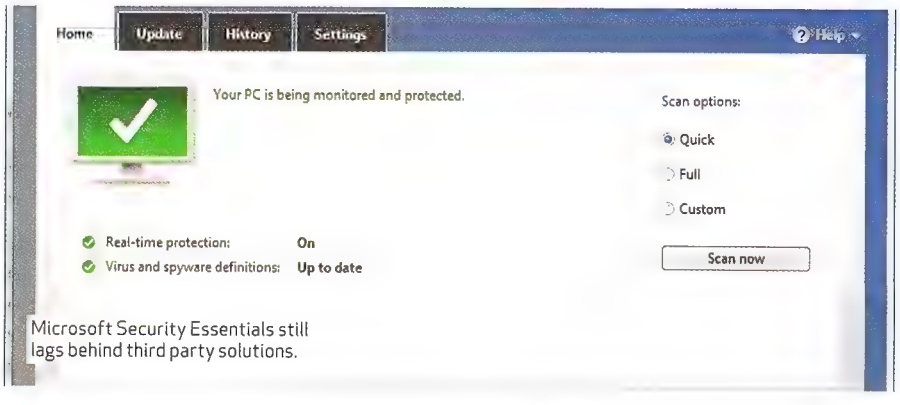
And then there are mobile viruses, which primarily affect Android because of its more open architecture. In the first quarter of 2014 alone, the number of mobile banking trojans almost doubled, with some high profile attacks like Faketoken targeting increasingly prominent mobile wallet systems.

THE SOLUTION

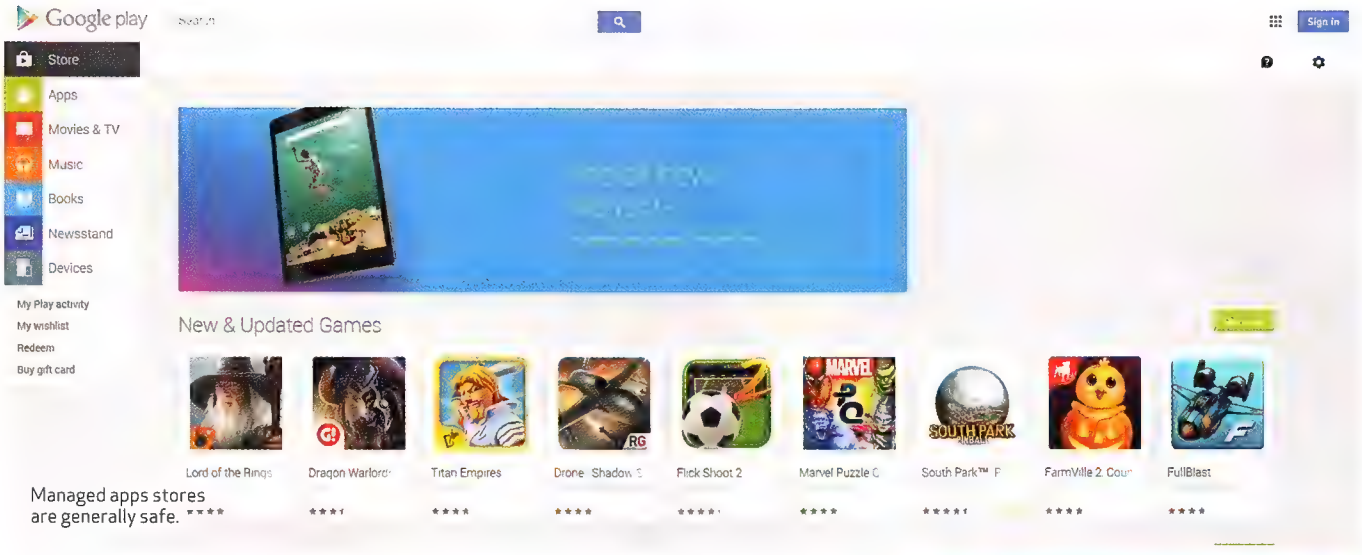
Anti-malware software is still your first line of defence against these attacks – although now you have to be cognisant of the need to cover multiple platforms.

For Windows, it looks very much like third-party anti-virus solutions are still the go. Although Microsoft provides Windows Security Essentials for free for Windows 7, and integrates it into Windows Defender on Windows 8, its protection remains disappointing. In its August 2014 anti-virus tests, AV-Test found that Security Essentials picked up just 77% of 0-day and new viruses, where most of its competition scored in the 97-100% range.

Android does not come with an integrated anti-malware solution – but there are many options available.



Microsoft Security Essentials still lags behind third party solutions.



Among the solutions that scored 100% in AV-Test's benchmarks were BitDefender Mobile Security, Bullguard Mobile Security, ESET Mobile Security, Trend Micro Mobile Security and Norton Mobile Security.

Aside from having a software solution in place, all that you can really do is take care with what you run on your computing platforms. The use of curated app stores is a good start. Although the Google Play store, for example, has been infiltrated by viruses a few times, infected files rarely stay up for long, and setting your Android to only support apps from the official store is good policy (the control is found under 'Security > Unknown sources' in the settings).

On Windows 8 you can use the Windows Store, which is a good place to get "safe" apps – or at least non-desktop ones. For now, the Windows Store still redirects you off-site for any Desktop apps – which is to say, the vast majority of existing apps – and many desktop apps don't even bother listing on the Windows Store. A blog post on Microsoft's site indicated that when Windows 10 comes out it will include support for Desktop apps in the Windows Store, but that blog post has since been deleted so at the time of writing nothing was confirmed.

Passwords and hacking

THE PROBLEM

Nary a week goes by now without news that somebody's phone, cloud storage, web site, Facebook, Instagram or twitter account has been hacked

Contrary to what you see on TV and in the movies, however, the vast majority of these hacks are not the product of some technical wizardry. Instead, they're most commonly the product of password hacks, scams, spyware and social engineering. Actual technical hacks are quite rare these days – everything is pretty much firewall protected by default, and software and hardware developers have become much better at securing their products. But what they can't do is protect users against letting other people know their password and private information that might allow them to bypass online security checks.

THE SOLUTION

The easy answer is "good passwords" – which is to say random strings of alphanumeric characters. At least eight characters long, including upper and lower case and numbers. Of course, given that each of us has roughly two million different passwords we have to remember (and using the same password for everything is just bad), that's not all that practical.

However, a password manager is practical. Our current top pick is LastPass (**lastpass.com**). LastPass is free (for the basic version), easy to use, remembers your passwords for both apps and web sites, is multi-platform, includes cloud syncing and backup and will automatically generate and store passwords for you. You only need to remember the password for LastPass.

It primarily works as an add-on for your web browser, and will import your saved browser passwords when you install it. Afterwards, you can click on the LastPass browser button to access its features – you can set it to automatically log you into sites with saved passwords, you can use the password generator, auto fill out forms (including card numbers) or configure your identity.

LastPass is certainly not the only password manager out there. If you don't like it, you can also try KeePass (**keepass.info**), eWallet (**www.iliumsoft.com/ewallet**), DashLane (**www.dashlane.com**), RoboForm (**www.roboform.com**) and F-Secure Key (**www.f-secure.com**). If you purchase a suite (see page 44), many now come bundled with password managers built in, or have them available as separate downloads. Symantec, BitDefender and F-Secure have particularly solid implementations.

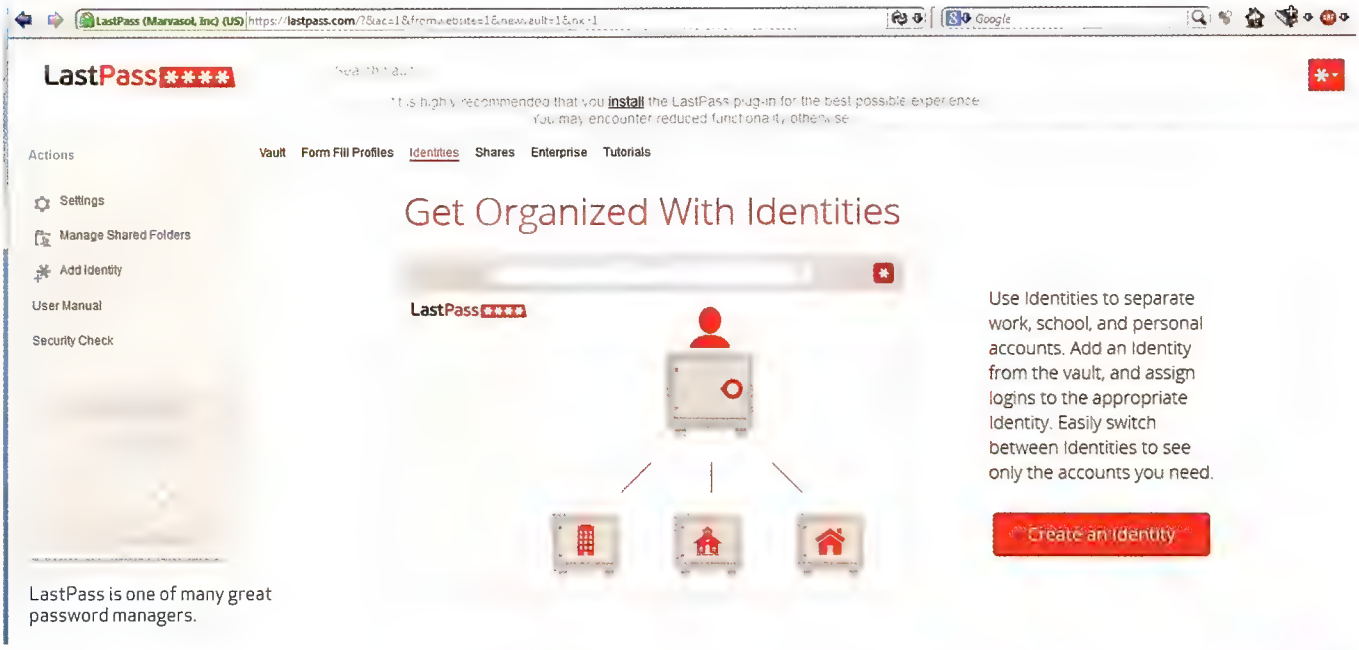
HOW THEY GOT HACKED

The celebrity hacking scandal of August and September was one of the most-publicised instances of privacy invasion in recent memory. Over a hundred celebrities had their cloud phone backups hacked and their private photo and video collections were then posted online.

It's not 100% clear how the celebrity phone accounts were hacked, but according to Apple it wasn't because of a technical vulnerability in the iCloud services. Instead, the hacker(s) in question accessed the iCloud phone backups through good old password hackery. The passwords were obtained either through a phishing attack, or, more likely through brute force attacks.

The latter is surprisingly simple to accomplish, and does not require any significant technical knowledge on the part of the hacker. Instead, existing scripting tools are used to make a "dictionary attack" against an account. That is, simply trying out a bunch of common words and phrases and seeing if one works. An automated tool can try hundreds or thousands every hour.

If nothing else, the incident demonstrates the need for good passwords. Regular words and phrases don't cut it anymore.



LastPass is one of many great password managers.

Web tracking

THE PROBLEM

Facebook is everywhere. So is DoubleClick online advertising. Disqus, too. And thanks to tracking cookies, these organisations, and many others like them, have a tremendous ability to track your online activity.

Tracking cookies allow them to know when you visit a web site with one of their ads or widgets embedded. By monitoring your activity, they can build a pretty complete picture of who you are and what you like — all the better to deliver targeted advertising.

If you'd rather not be so tracked, however, there are some remediation tools available to you. Of course, you can switch off all cookies — but that can be pretty inconvenient. After all, cookies can be useful for storing your site preferences, for example, and are pretty crucial in online shopping.

THE SOLUTION

Disconnect (**disconnect.me**) is far and away our current favourite solution for dealing with tracking cookies. It's available as an add-on for Chrome, Safari, Firefox and Opera, and it filters out a tremendous amount of third-party content. When you visit a site that has a Facebook or other social networking widget embedded or calls out to ad services or web analytics, Disconnect automatically blocks them. You can whitelist a site if you want to (in case you actually do want to use the Facebook Like button), but by default anything that might be used to track you is zapped.

You should also learn to use and love private browsing. Internet Explorer, Chrome, Opera and Firefox all have privacy modes. In Chrome it's Incognito; in Firefox and Opera it's Private Window; in IE it's InPrivate Browsing. With these tools, you open a new private/incognito tab or window and any sites you open in the tab or window are effectively sandboxed. They can't talk to your existing cookies, and when you end the private/incognito session all cookies created during it are deleted. It effectively foils attempts to track you using cookies. Just between us chickens, it's also a handy way to get around sites that limit visitations, such as sites that only allow you to view X articles per month.

Spam

We didn't include spam on the list because, well, it's not really the problem it used to be. Sure, there's still plenty of it around, but between web-based filtering and automatic filtering in Outlook/Thunderbird, it not really the plague-like issue that it once was.

Identity theft, phishing and scams

THE PROBLEM

While technical defences have improved in recent years, the sophistication of social engineering attacks has also increased significantly. The Symantec 2014 Internet Security Threat Report revealed that identity theft using social networking is a growing problem, with criminals using Facebook profiles to create or acquire credit card information. What's more, they're using it to make more sophisticated phishing attacks and scams. According to Symantec, the number of target "spear-phishing" attacks grew by 91% in 2013.

The classical phishing attack for example, is an urgent email from your "bank" that promises dire consequences if you don't click on a link and enter your Net Banking password. Users have become savvy to that, and banks better protected with two-factor authentication, so new techniques have been employed. In one spear-phishing example, you might get an email that appears to be from someone you know like your boss — information gleaned from your Facebook or Linked-in profile — that requests that you urgently open a malware-infected file. The malware is then used to spy on your system and gather personal financial information.

THE SOLUTION

Security suites are your best technical solution. The best ones will include identity theft protection tools and complex mail filters that can pick out scams and remove malware from email attachments.

Outside of suites, it's really just a matter of eternal vigilance. Be wary of executable email attachments. Assume anybody who asks for personal information is a scam artist.

Megahacks

Some very large organisations have had their customer databases hacked in the past year, and millions of personal financial records compromised. Typically using SQL injection techniques, hackers have acquired hundreds of millions of financial records and email addresses from major companies. If a company you've entrusted with your financial data gets hacked, the best thing you can do is contact your financial institution, which can provide advice on what your next move should be, if any. The major banks have become quite adept at dealing with this of late!

Don't overshare on social networks. Teach your kids and significant others to assume that people you speak to and meet online are not to be trusted by default.

The snoops

THE PROBLEM

You are being watched. The government has a secret system – a machine – that spies on you every hour of every day.

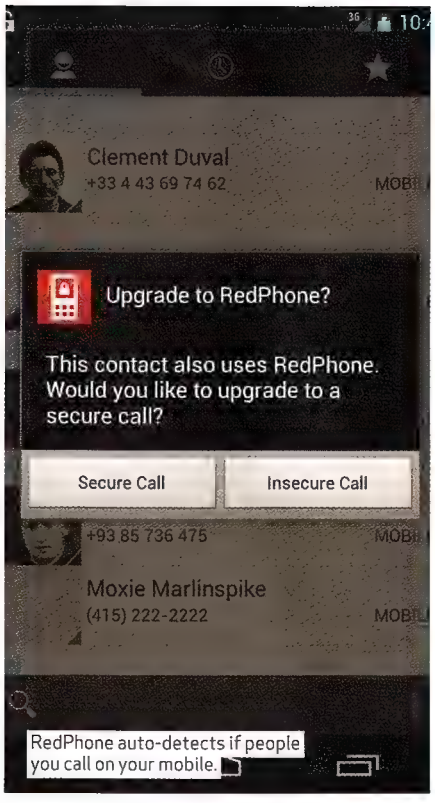
OK, not really, but thanks to Edward Snowden, we do know that the surveillance state is real and that internet monitoring is happening on a massive scale. Once again, spy agencies in Australia are pushing for regulations to force ISPs to monitor and record all the sites we visit, and it's also well known that many companies such as Google are keeping massive archives of our online activity for their own purposes.

THE SOLUTION

If that's something you're uncomfortable with, then there are various tools you can use to foil attempts to monitor your activity and intercept your data. We don't have space here to go into them all in depth, but here are our top picks for maximum data privacy.

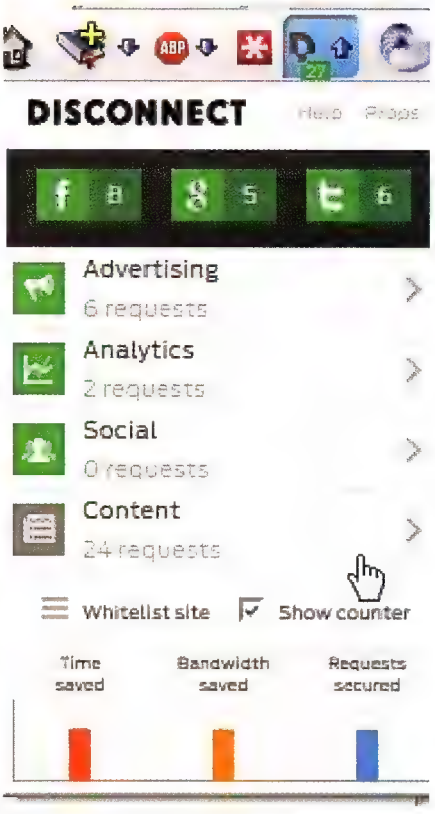
Encrypted text chat: For the PC we like ChatCrypt (**www.chatcrypt.com**) – it's a little rough for one-to-one communications, but for encrypted group chat it works well. On Android phones we like TextSecure (**whispersystems.org**), which looks and works a lot like SMS, except it's both encrypted and its free apart from miniscule data charges.

Encrypted voice chat: Jitsi (**jitsi.org**) for Windows and RedPhone (**whispersystems.org**) for Android provide encrypted voice chat. Jitsi works, in practice, a lot like Skype – except that it's not controlled by Microsoft and calls can be encrypted. RedPhone integrates smoothly into your Android phone, and you can make calls to other RedPhone users quite transparently – it's just like making a regular phone call.



Encrypted email: Gpg4win (**www.gpg4win.org**) is your go-to solution for email encryption – or encryption of any other text-based correspondence, really. You'll have to do a little reading to get up to speed on using it.

Untraceable browsing: the TOR browser (**www.torproject.org**). With TOR, all your connections are routed through several other PCs, obscuring the connection between you and site you're visiting and making your IP address effectively untraceable. It's the ultimate in privacy.



If TOR is a little heavy handed for you, you can also use a VPN service, of which there are dozens. StrongVPN (**strongvpn.com**), IPVanish (**ipvanish.com**), VyprVPN (**vyprvpn.com**), HideMyAss (**hidemyass.com**) and many other options are available to you.

The RSA backdoor

One of the many programs revealed during the Edward Snowden leaks was Bullrun, a clandestine NSA operation devoted to the decryption of private and governmental communication using custom-made hardware along with technical backdoors.

Perhaps the most shocking revelation was that RSA, the makers of one of the world's most widely used encryption algorithms, accepted $10 million US dollars from the NSA to use as default the Dual_EC_DRBG random number generator in its BSafe toolkit. Dual_EC_DRBG had a known deficiency that allowed the NSA to more easily crack encryption keys. It was later revealed that this payment was part of a larger program that was designed to infiltrate and control cryptographic standards agencies and organisations, including the Internet Engineering Task Force (IETF).

Following the revelations in 2013, RSA stopped using Dual_EC_DRBG as the default and recommended that existing users switch to one of the other random number generators available. The incident has put a big black mark on many closed source encryption providers, and groups like OpenSSL and the FreeBSD developers have stopped using many hardware random number generators for fear that they too may have been compromised.

How to secure your Mac

It's not as safe as it once was for Mac users, says Matthew JC. Powell.

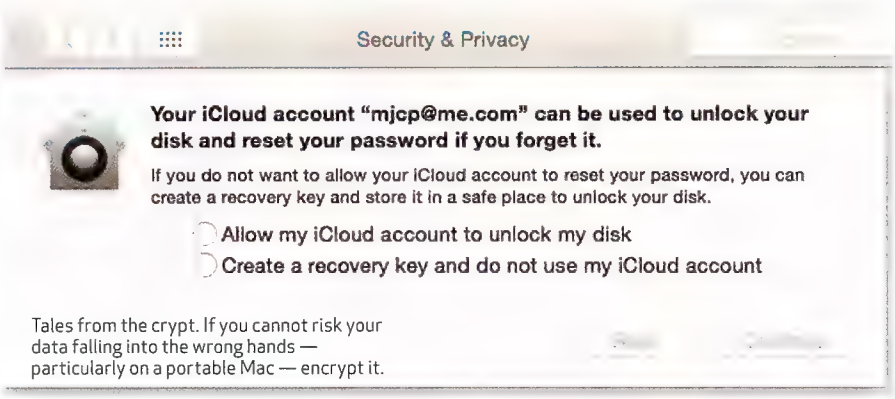
Once upon a time, Mac users used to feel quite snug and secure in a little bubble far away from the many and varied threats that plagued users of other operating systems. Part of it was genuine security inherent in the system, but a lot was "security through obscurity" – the Mac user base was too small a target for bad guys to bother with.

That's no longer true, and there are real threats attacking Macs now. Thankfully, Apple has also beefed up the security of the system.

Does a Mac need antivirus? Yes. This is no longer a question. There may be fewer threats than there are on Windows, but there are not zero threats. Plus, your Mac can be used as a vector to infect other computers over networks. There are some excellent AV products available for very cheap or even free, so get one. Apple does include very basic AV within OS X itself, but third-party products tend to be updated more quickly.

As for Apple's other inbuilt security measures, you'll find them under the Security & Privacy tab in System Preferences.

Under General, you'll see you have the option to allow Apps downloaded only from the Mac App Store (ie ones that Apple itself has screened to make sure there's no malware), apps from the App Store and identified developers (whom Apple has entrusted with a certificate) or from Anywhere. The last option is obviously the most freewheeling – proceed at your own risk.


Security & Privacy
Your iCloud account "mjcp@me.com" can be used to unlock your disk and reset your password if you forget it.
If you do not want to allow your iCloud account to reset your password, you can create a recovery key and store it in a safe place to unlock your disk.
Allow my iCloud account to unlock my disk
Create a recovery key and do not use my iCloud account

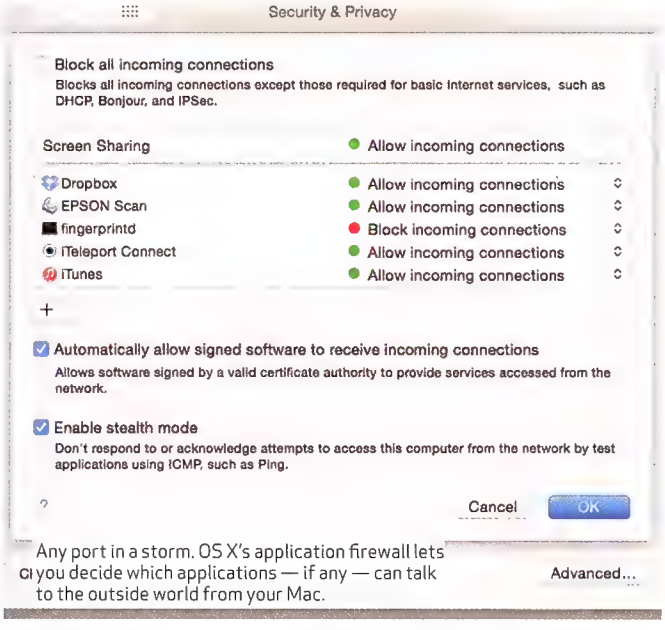
Tales from the crypt. If you cannot risk your data falling into the wrong hands – particularly on a portable Mac – encrypt it.

Under FileVault you have the option to encrypt your user folder, so that if your computer is stolen the thieves would need both your password and your recovery key in order to get at your data. Obviously this is most useful for users of portable Macs, but for the security conscious it's an extra thing.

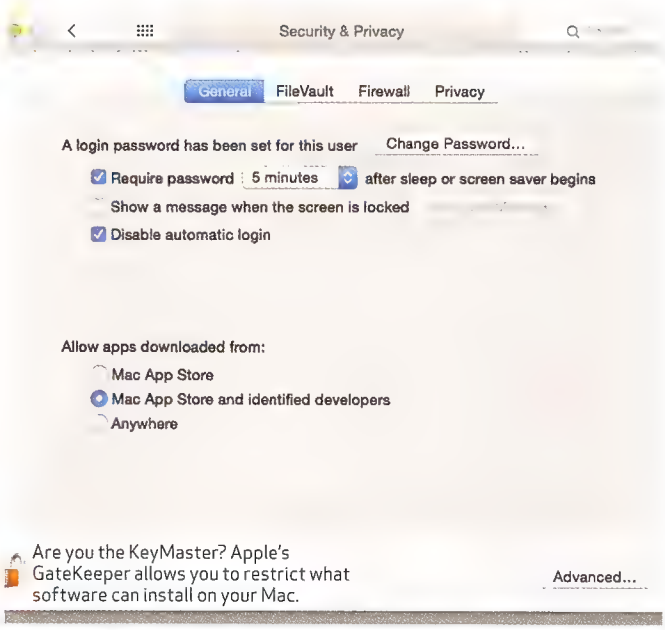
Finally, under Firewall you'll see the Mac's application-based firewall. This is in addition to the firewall that runs as part of OS X's Unix underpinnings. It allows you to choose which applications are permitted to access the internet from your Mac. If you want to, you can block all incoming internet traffic and even enable Stealth mode – in which your Mac does not respond to any incoming pings on any port, even to indicate that the ports are closed. In Stealth mode, it's like your Mac doesn't exist.

Of course, with the Firewall at full blast you can't use iCloud Drive or iTunes Radio or FaceTime or any of the fun things the Mac can do when it has access to the internet – so you choose the level of security versus freedom you want.

Speaking of iCloud, Apple's online services are becoming more and more central to the Mac experience. If you want to guarantee the security of your data you ought to take advantage of iCloud's two-step verification. For more details on that, see the section on securing your iOS device.


Security & Privacy
Block all incoming connections
Blocks all incoming connections except those required for basic Internet services, such as DHCP, Bonjour, and IPSec.
Screen Sharing
Allow incoming connections
Dropbox
Allow incoming connections
EPSON Scan
Allow incoming connections
fingerprintd
Block incoming connections
iTeleport Connect
Allow incoming connections
iTunes
Allow incoming connections
Automatically allow signed software to receive incoming connections
Allows software signed by a valid certificate authority to provide services accessed from the network.
Enable stealth mode
Don't respond to or acknowledge attempts to access this computer from the network by test applications using ICMP, such as Ping.
Cancel
OK
Advanced...

Any port in a storm. OS X's application firewall lets you decide which applications – if any – can talk to the outside world from your Mac.



Are you the KeyMaster? Apple's GateKeeper allows you to restrict what software can install on your Mac.

Security on iOS

Matthew JC. Powell explains how to stay safe on iPhone and iPad.

iOS has had a bit of a bad run in the press of late, security-wise, thanks to apparent breaches of iCloud security that allowed some people's private photos to fall into the wrong hands. The good news is, it's actually pretty easy to stop that sort of thing happening to you.

First and most important, have a strong password for iCloud. A complicated, unguessable password that will withstand "brute force" attacks is a great asset. Even if you have to write it down to remember it — the hackers would need to get the bit of paper from you, wouldn't they — a strong password is better than a memorable one.

On a web browser, go to **appleid.apple.com** and enter your Apple ID and password. Then click on "Password and Security", whereupon you'll have to answer some security questions. Under "Manage Your Security Settings" the first item is two-step verification. Once you've set that up, each time you try to access your iCloud account via the web site, whether for photos or mail or whatever, you'll be sent an access code via SMS. You'll need both your iCloud password and that code to get your data. So your private photos will stay private.

You should also have a password, rather than a passcode, on your iPhone or iPad. Go to 'Settings > Touch ID & Passcode' and enter your passcode (you do have one, right?) then tap on the slider next to Simple Passcode. A simple passcode is the four-digit number you've used up until now. Once you switch off Simple Passcode, you'll be asked to enter a password — remember to make it hard to guess. Mix in upper- and lower-case letters as well as numbers. Write it down if you must, but keep the bit of paper separate from your device.

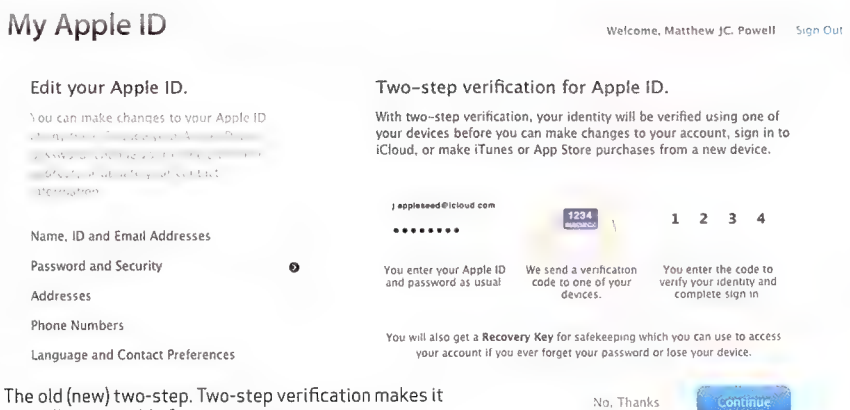
Also in the Touch ID & Passcode section of Settings, you'll see the option right down the bottom

It's also worth enabling Touch ID if you have an iPhone that supports it. Particularly with the iPhone 6 and iOS 8, it's a very reliable and convenient means to get into your phone, as well as being extremely difficult to hack. Maybe someone could fake your fingerprints with the right gear and enough time, but they'd really have to be determined. When ApplePay eventually reaches Australia you'll want to use a fingerprint rather than a password for purchases, so might as well get on it now.

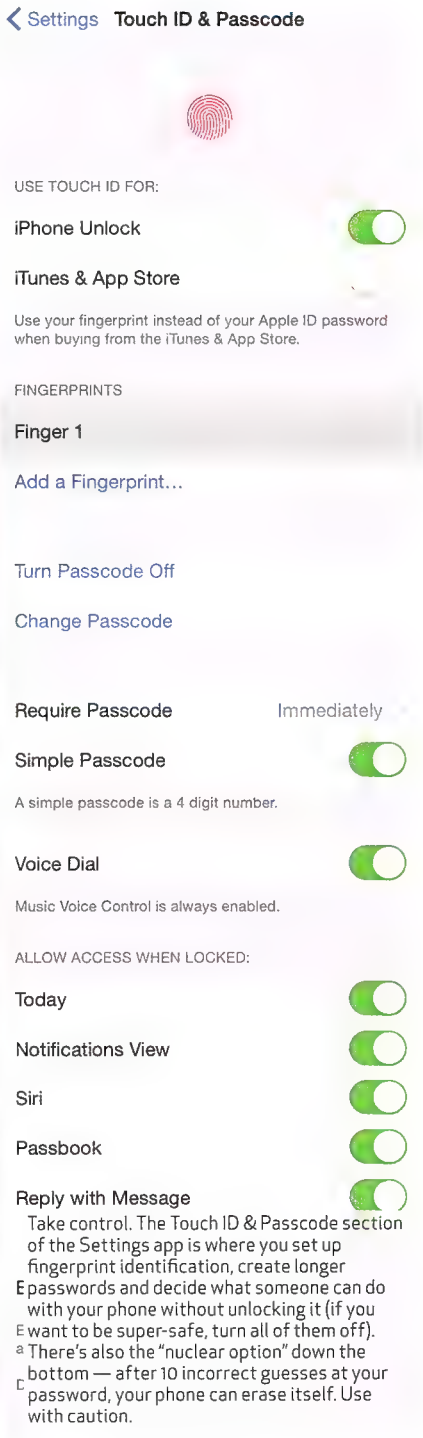
One final word of advice for secure iPhone and iPad usage: don't jailbreak. Most of the cool reasons people had for jailbreaking in the past are more or less moot with the newer versions of iOS, and every single confirmed malware attack on iOS so far has come via jailbroken iPhones. It just isn't worth the risk anymore. ■

Matthew JC. Powell

Find it, or not. Using the Find My iPhone app, you can track all of the devices associated with your Apple ID, including Macs. If you discover that a device is not merely under the sofa but travelling away from you at speed, you can put it into "Lost Mode" which locks it so that it can only be reactivated at an Apple Store. You also have the option to erase the device remotely, if you feel that recovery is impossible.


My Apple ID
Welcome, Matthew JC. Powell
Sign Out
Edit your Apple ID.
Name, ID and Email Addresses
Password and Security
Addresses
Phone Numbers
Language and Contact Preferences
Two-step verification for Apple ID.
With two-step verification, your identity will be verified using one of your devices before you can make changes to your account, sign in to iCloud, or make iTunes or App Store purchases from a new device.
1 2 3 4
You enter your Apple ID and password as usual
We send a verification code to one of your devices.
You enter the code to verify your identity and complete sign in
You will also get a Recovery Key for safekeeping which you can use to access your account if you ever forget your password or lose your device.
No, Thanks
Continue

The old (new) two-step. Two-step verification makes it virtually impossible for someone to gain access to your iCloud data, even if they guess your password.



Take control. The Touch ID & Passcode section of the Settings app is where you set up fingerprint identification, create longer passwords and decide what someone can do with your phone without unlocking it (if you want to be super-safe, turn all of them off). There's also the "nuclear option" down the bottom — after 10 incorrect guesses at your password, your phone can erase itself. Use with caution.

Protecting your PC

Nathan Taylor puts 12 security suites for Windows on test to find out who currently offers the best PC protection.

Although it has made progress, Microsoft is still struggling to match up with third-party tools when it comes to Windows security. In the latest round of tests by the German AV-Test Institute, Windows Defender/ Microsoft Security Essentials still lagged well behind its major competition, picking up just 76% of 0-day viruses and 79% of existing viruses – in a world where most of the rest were rating in the 97-100% range.

And then there are things that Windows doesn't do at all, or does very poorly, like parental controls, password management, identity protection and sandbox execution.

All this is to say that, yep, a security suite is still a pretty good investment. So which is the best for you right now?

WHAT THE TEST SCORES MEAN

The test scores in the table below are the product of an extensive set of tests run in August 2014 by the AV-Test Institute. You can find a full set of results on its site at **av-test.org**, including results for a number of products not reviewed here as well as mobile anti-virus solutions.

AV-Test grades anti-malware solutions in three ways: protection, performance and usability.

Protection is a measure of how well the suite detects infections. There are two parts: a 0-day test which pits the anti-malware solution against a suite of "new" viruses which definitions haven't been written yet. The second test pits the anti-malware solution against a suite of thousands of "known" viruses released in the month prior to the test, showing how responsive the company behind the product at getting out new virus definitions.

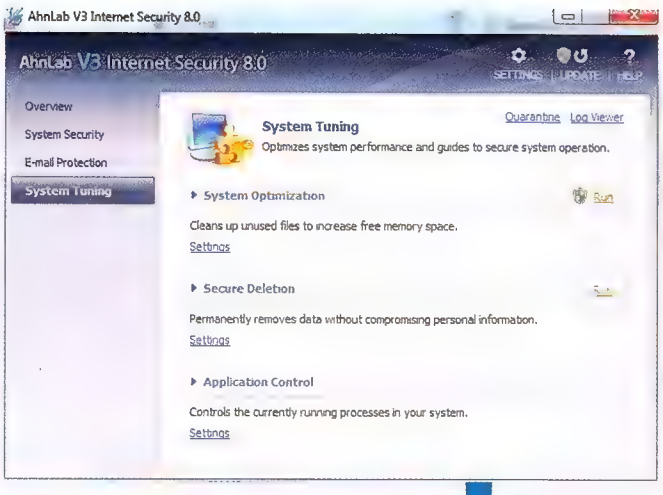
The performance rating tells us how many slow-downs AV-Test experienced relative to a system without the anti-malware installed. Performance tests are run for everyday activities with and without the anti-malware.

Usability is not a measure of ease of use. Rather, it's based on the number and type of false positives produced by the anti-malware solution. Every time a security solution blocks a legitimate program, it's a pain for the user and a black mark against it with respect to usability.

For each metric, a rating between 0 and 6 is given to each suite; as well as an aggregate score that is simply the sum of all three scores.

TEST RESULTS: SECURITY SUITES FOR WINDOWS

TESTED PRODUCT	AHNLAB V3 INTERNET SECURITY 8.0	AVAST! INTERNET SECURITY 2014	AVG INTERNET SECURITY 2014	BITDEFENDER INTERNET SECURITY 2015	BULLGUARD INTERNET SECURITY (14.1)	COMODO INTERNET SECURITY PREMIUM 7.0	ESET SMART SECURITY 7	F-SECURE INTERNET SECURITY 2104	KASPERSKY INTERNET SECURITY FOR PCS 2015	MCAFEE INTERNET SECURITY	SYMANTEC NORTON INTERNET SECURITY 2014	TREND MICRO MAXIMUM SECURITY 2105
PROTECTION AGAINST 0-DAY MALWARE ATTACKS	89%	98%	97%	100%	99%	100%	100%	100%	99%	100%	100%	100%
DETECTION OF MALWARE DISCOVERED IN THE LAST 4 WEEKS	100%	97%	97%	100%	100%	99%	100%	100%	100%	100%	100%	100%
IMPACT OF THE SECURITY PRODUCT ON THE SPEED OF THE COMPUTER IN DAILY USE (HIGHER IS WORSE)	5	3	5	0	0	5	5	3	0	0	0	1
FALSE WARNINGS OR BLOCKAGES WHEN VISITING WEBSITES	0	0	0	0	0	0	0	0	0	0	0	0
FALSE DETECTIONS OF LEGITIMATE SOFTWARE AS MALWARE DURING A SYSTEM SCAN	1	0	1	0	1	3	1	1	0	0	1	1
FALSE BLOCKAGES OF CERTAIN ACTIONS CARRIED OUT WHILST INSTALLING AND USING LEGITIMATE SOFTWARE	0	0	0	0	1	3	0	0	0	0	0	1
AV-TEST PROTECTION SCORE (OUT OF 6)	3.5	3.5	3.5	6.0	6.0	5.5	5.5	6.0	6.0	6.0	6.0	6.0
AV-TEST PERFORMANCE SCORE (OUT OF 6)	3.5	4.5	3.5	6.0	6.0	3.5	3.5	4.5	6.0	6.0	6.0	5.5
AV-TEST USABILITY SCORE (OUT OF 6)	6.0	6.0	5.5	6.0	5.5	5.0	5.5	5.5	6.0	6.0	6.0	5.5
TOTAL POINTS (OUT OF 18)	13.0	14.0	12.5	18.0	17.5	14.0	14.5	16.0	18.0	18.0	18.0	17.0



SECURITY SUITE

US$69.95 FOR 3 PCS FOR 1 YEAR | WWW.AHNLAB.COM

AhnLab V3 Internet Security 8.0

AhnLab still has a lot to do to become a player.

AhnLab is not a name well known in Australia – indeed we struggled to find local retailers that sell it – but given we hadn't seen it before, we thought it was worth checking out. You can download it directly from the US site.

For now it most definitely lags behind its major competition. It ticks most of the major boxes, but as we saw with a number of suites when they first released, everything outside of anti-virus feels a little tacked on.

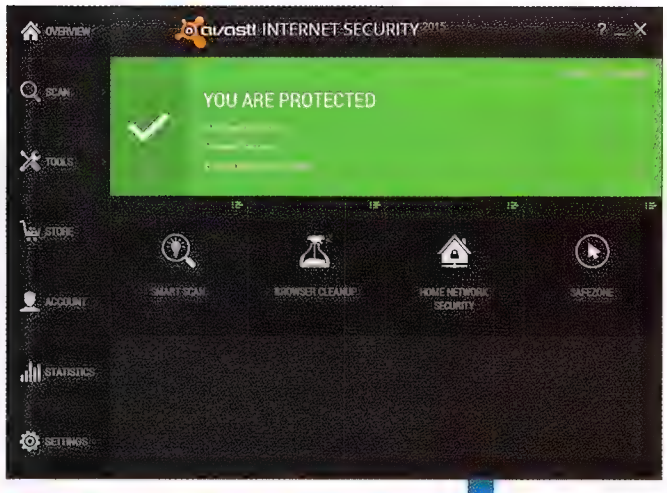
There's a completely unnecessary personal firewall, web site filtering, some pretty poor manually-configured spam filtering and a handful of PC optimisation tools. There's no password manager or identity theft protection, no backup or anything else really. We did like the file shredder and system cleaner, but everything else outside of anti-malware was really just kind of 'meh,' and we probably wouldn't favour any of them over Windows' built-in defences.

The interface is OK. It hasn't been updated for Windows 8 and looks rather like it came out in 2008, but it gets the job done and most users should have no problem navigating it.

So is its anti-virus compelling enough to sell it? For now, no. It covered existing viruses and known threats pretty well, but its 0-day protection wasn't great (although still significantly better than Microsoft Security Essentials/Windows Defender). It thankfully produced few false positives, but it also slowed the computer down somewhat.

Verdict

It combines mediocre anti-virus with, well, not much. This is a suite with a long way to go.



SECURITY SUITE

$89.99 FOR 3 PCS FOR 1 YEAR | WWW.AVAST.COM

Avast! Internet Security 2015

It's more than good enough to compete with other paid solutions.

Avast's free anti-virus product is well known as one of the best ways to upgrade your defences without spending a dime. But is it worth splashing an extra $49.99 for a single PC license, or $89.99 for three, for Avast's suite?

Previously we would have said no, but the latest version of the product has grown significantly. Avast! has layered in a host of extras, built a touch-friendly interface and has smoothly integrated its numerous components into that interface. The spam filter isn't worth much, and it lacks a few things commonly found on the other major suites, like parental controls and PC tuneup, but it does boast a few things the other players can't.

In particular, we're huge fan of the software update feature, which scans your installed programs and checks for more recent versions for you – then downloads and updates them for you. It even worked for things like Irfanview and WinRAR installed on our test system.

The remote control tool is unique, and somewhat easier to grasp than Windows Remote Assistance, while the Sandbox environment for running potentially risky software is not unique, but really well implemented. As with several other suites, it includes a built in "SafeZone" browser as well, which works as a kind of sandbox for your online banking activites.

AV-Test benchmarked the free version 2014 of Avast!, but the suite uses the same engine and it proved capable. It fell a few percentage points short of perfect, and there was a modest performance hit, but the engine should get the job done.

Verdict

A suite with a smooth, nicely integrated interface and excellent sandbox and software updates.

SECURITY SUITE

$89.52 FOR 3 PCS FOR 1 YEAR | WWW.AVG.COM.AU

AVG Internet Security 2015

A suite that has grown every year, but doesn't ask too much of you.

We've been particularly fond of AVG's interface for several versions, now, and when it comes to ease of use, the 2015 retains that recent excellence. The interface works extremely well in touch screen environments, but is also accessible on a desktop as well. It manages to make the many features of AVG understandable and accessible.

And there are many features. Like Trend Micro and McAfee, AVG's internet suite bundles together a pretty huge suite of utilities, from the core elements like anti-virus and firewall to valuable extras like AVG Data Safe, which creates encrypted directories to store your most valuable files and the link scanner that blocks links to harmful web sites.

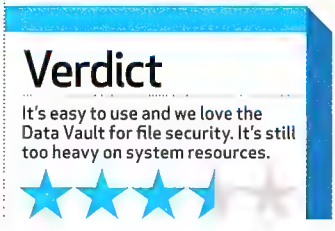
The application has a switch for identity protection, but it provides no indication of what it actually does – and the settings are only on-off, which doesn't fill us with confidence. A PC optimiser is available as a separate download.

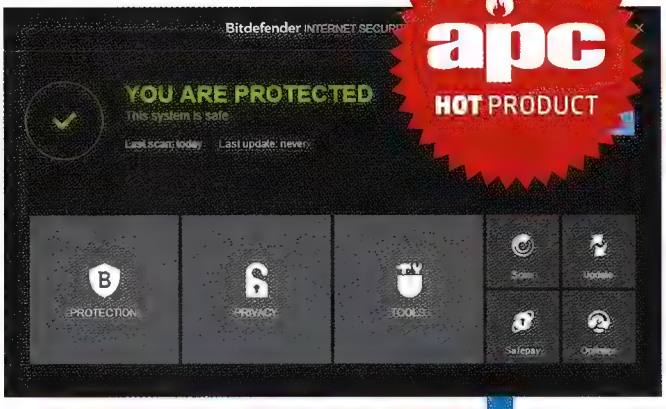
There a still a few elements missing – a password manager, parental controls or backup, for example – but the suite covers most of the ground you'll want covered.

AV-Test benchmarked the 2014 edition of the suite (the 2015 version wasn't available at test time), and AVG put up some decent results, but was still a few percentage points short of the coveted 100% ranking. It also sucked up a few too many PC resources, though it did not bother the user with false positives.

Verdict

It's easy to use and we love the Data Vault for file security. It's still too heavy on system resources.





apc HOT PRODUCT

SECURITY SUITE

$99.95 FOR 3 PCS FOR 1 YEAR | WWW.BITDEFENDER.COM.AU

BitDefender Internet Security 2015

Its still got it.

It's one of four products to receive a perfect '18' score from AV-Test (along with Symantec, Kaspersky, and McAfee) and it remains our top pick as the best consumer security suite on the market today.

BitDefender has everything. Seriously. Firewall, anti-spam, anti-virus, parental controls, a password manager/wallet and form completion and PC tuneup are all there. It scans links posted to social networks and received from search engines for harmful connections, and can filter specific phrases so that you or your kids don't post private information online.

If you're will to splash an extra $30 on BitDefender Total Protection you also get file encryption, online storage and anti-theft device location. What's more, every one of these features is at least solid, and several are exceptional.

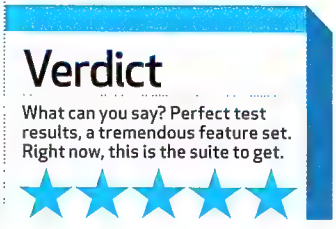
There aren't a huge number of new features in this version, but BitDefender was already pretty packed. The most notable are a one-click PC tuneup tool and a startup manager that lets you control and delay programs that load at boot in order to minimise start times. It also sports a slightly cleaner, Windows 8 touch-friendly interface.

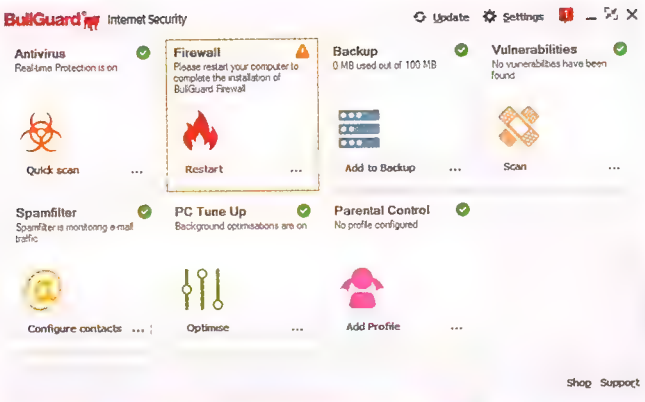
It's also a suite that works for both people who like to be in charge, as well as people who want to install and forget. In autopilot mode the suite doesn't bother you, but if you like to drill down deep the option is there.

The suite's test results were literally perfect. 100% detection, no false positives, no notable impact on performance. You can't really ask for more than this.

Verdict

What can you say? Perfect test results, a tremendous feature set. Right now, this is the suite to get.





SECURITY SUITE

$89.95 FOR 3 PCS FOR 1 YEAR | WWW.BULLGUARD.COM

BullGuard Internet Security (14.1)

Not as deep as some, but impressive nonetheless.

It has been a few versions since we last checked in on BullGuard, but its considerable AV-Test lab results have compelled us to take another look. It fell just 1% short of a perfect 0-day score, had virtually no impact on system performance and produced very few false positive results. When it comes to anti-virus, BullGuard certainly has the goods.

But what about the rest of the suite? While it lacks the depth of McAfee or BitDefender, the tools it does have are worthwhile. Capable parental controls are included, along with a PC tuneup tool (really just a system cleaner), spam filters, web site filters and link scanning and 5GB of online backup. The last is expandable if you're willing to pay a little extra for it.

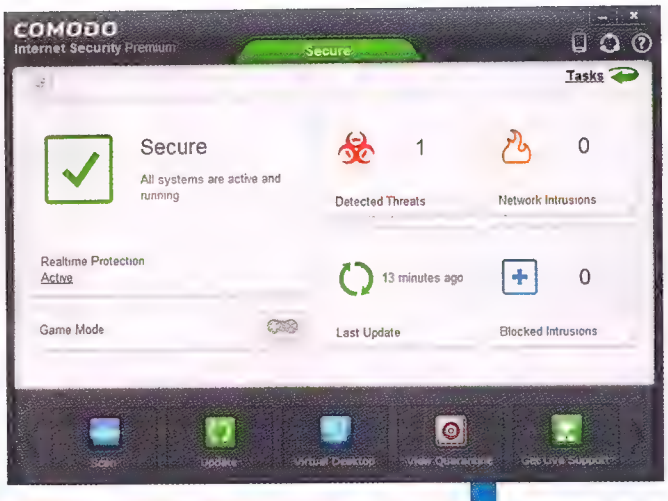
The interface is a tad old-fashioned, comprising a grid of tools. That said, there are some excellent design decisions, like the simple online backup tool where you simply specify which directories you'd like to back up, or the parental controls that are easy to manage and linked to Windows user profiles.

Most of the settings are on-off toggles, so if you like to drill down, this may not be the product for you. We didn't find it particularly inclined to produce popups – which is a good thing – although there were a few. They were competently explained when they did pop, which makes the decision making process much easier for the user.

Verdict

An excellent anti-virus, but some things, like web filters and identity theft protection are missing.

★★★★½



SECURITY SUITE

FREE, US$40 FOR A VERSION WITH LIVE SUPPORT. WWW.COMODO.COM

Comodo Internet Security Premium 7.0

It's not that great, but it's free.

While many vendors are prepared to give away their anti-virus software for free to home users, Comodo is unique in that it is prepared to give away its entire suite. Unfortunately, that's not really saying all that much, since there isn't really any meat in the suite apart from the (very good) anti-virus.

The suite includes web browsing protection and parental controls via a dedicated DNS service, a firewall no better than that built into Windows, a rather rough sandbox "virtual desktop" for running potentially insecure apps and, well, that's about it. It's also burdened by super-annoying popups and a retro interface that gives you little control over the elements of the suite and it generally poorly explained and unintuitive.

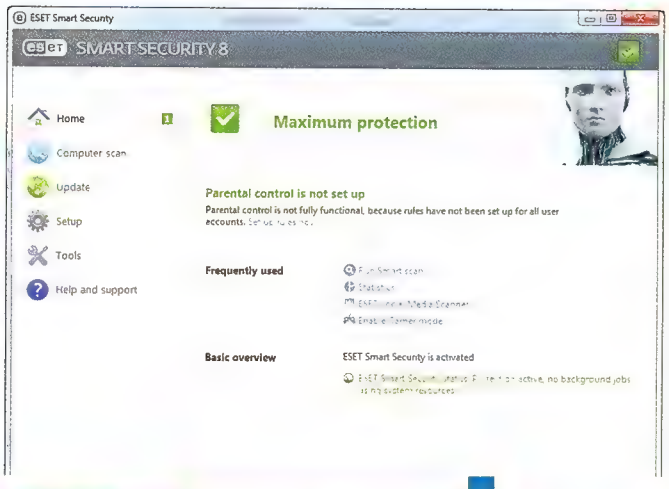
It may be a little unfair to compare it to paid suites, but there are paid versions of the suite that actually don't add much to the feature set of the suite itself. What they do give you is online storage, encrypted VPN access (with relatively limited bandwidth, to protect your data when using public hotspots) and GeekBuddy live support for virus removal. The encrypted VPN access alone may make the 'Pro' (US$40 per year) or 'Complete' (US$90 per year) seem worthwhile, but it's limited to just 10GB per month, so it's not useful for downloads.

If you're looking for a free anti-virus, we'd probably still recommend Avast's free solution over this. If you're looking for a free suite, you're better off making it yourself from various free components. For now, Comodo's free suite is just not worth installing.

Verdict

It's a freebie with good anti-virus. But it's not really a suite, and sucks up too many system resources.

★★★☆☆



SECURITY SUITE

$89.95 FOR 3 PCS FOR 1 YEAR | WWW.ESET.COM.AU

ESET Smart Security 8

A much-improved suite.

This suite is another one of those products that essentially began as an anti-virus product (NOD32) with extras tacked on so it could be sold as a "suite," but like Kaspersky before it, each iteration of the product is becoming more full featured and self-assured. It's now very capable, boasting anti-theft tools, parental controls, social media scanning and identity protection as well as web filters.

It's also easier to use than it has been in the past, although ESET still has some work to do on limiting popups and automating responses. It could also use an interface update – it currently uses mostly small text links and buttons, which don't play well in a touch screen Windows 8 environment.

ESET has also added some really nice touches. We love the PUP (potentially unwanted program) detection, for example, which removes programs like browser bars that might not technically be viruses but that nobody actually wants on their system.

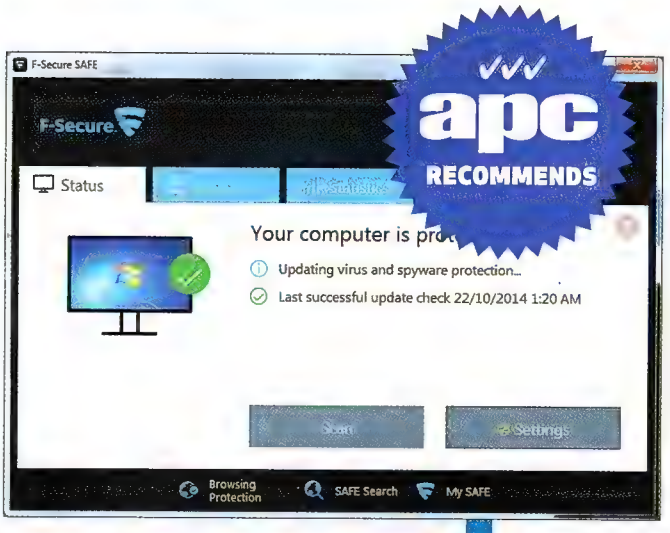
The anti-theft tools are also pretty cool, allowing you to view things through the camera, locate with GPS and much more, and parental controls are intelligently linked to Windows user profiles.

As we've come to expect from the NOD32 engine, virus detection is rock-solid, although it's let down by the undue burden it places on system resources. It's extremely configurable, more so than any other suite we've seen. Note that due to the timing of the benchmark, AV-Test used version 7 of ESET Smart Security for its test.

Verdict

ESET has a growing and smoothly integrated feature set, it will be one to keep an eye on.

★★★★½



apc RECOMMENDS

SECURITY SUITE

$78 FOR 3 DEVICES FOR 1 YEAR | WWW.F-SECURE.COM

F-Secure SAFE Internet Security

A release that focuses heavily on protecting your web browsing.

More than any other suite, F-Secure Internet Security has evolved significantly in the past year. Rather than the componentised approach of the past, where each element was essentially its own app within the suite framework, F-Secure now takes a more holistic approach to security across multiple devices and platforms. As we've seen with some Norton and McAfee products, licenses are applicable to both PC and mobile devices, and all device licenses are managed from a single online console.

On the PC, this year's release has focussed especially on web browsing. It filters malicious pages and provides OK parental controls, but it also has banking protection, search filters and content ratings. It's very clean and easy to manage, using browser add-ons to ensure that the bad stuff is inaccessible.

Some of the components of the PC suite aren't that impressive. The spam filter is straight out of 2004, and the firewall is kind of pointless – but for most users these aren't major considerations. Of course, anti-virus is always a major consideration – and F-Secure delivers there, with perfect detection rates according to AV-Test. It did produce a few false positives, and slowed the computer moderately, however.

If you're planning to use this suite, F-Secure provides several other free apps and tools that complement it and are definitely worth downloading (really, they should be bundled). In particular, F-Secure Key is a good password manager, and Younited is a secure media personal cloud tool.

Verdict

An elegant solution with excellent web protection and perfect virus detection.

★★★★½

SECURITY SUITE

$99.95 FOR 3 PCS FOR 1 YEAR | WWW.KASPERSKY.COM.AU

Kaspersky Internet Security for PCs 2015

A real competitor for BitDefender.

Once just a shell for an anti-virus application, Kaspersky Internet Security has grown up fast. It's now a premium suite, capable of going to toe-to-toe with any of the competition.

It still has excellent anti-virus, of course. It scored a perfect 18 rating from AV-Test, and fell just 1% short on the 0-day tests from making a clean sweep of the benchmarks. It produced no false positives and AV-Test could not detect any performance degradation on their test system while running it.

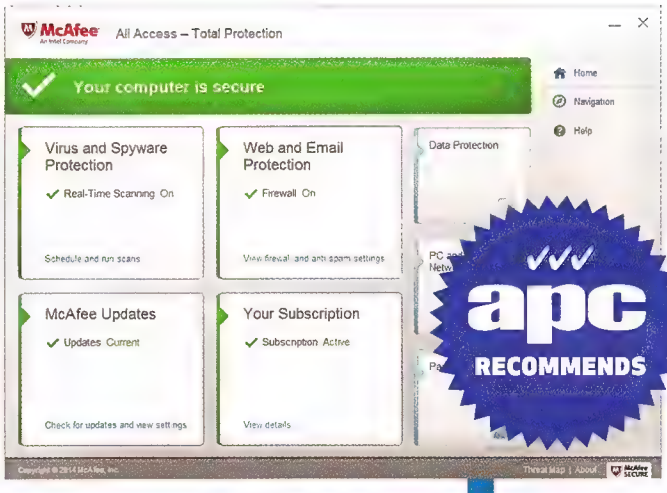
Beyond anti-virus is a really well built and integrated suite, with a new (mostly) touch-friendly interface and a full battery of defences, including parental controls linked to Windows user accounts, a protected 'safe' browser for online banking, a privacy cleaner, web filters including an ad banner remover add-on, and an onscreen keyboard to defeat keyloggers. There's also a "trusted application" mode, where only apps certified by Kaspersky as safe are run normally; all others are run in a sandbox environment to protect them from affecting the rest of the system. We found it worked well – most of the apps on our test system were certified and ran normally, even some obscure ones; it's clear that Kaspersky's trusted app database is extensive.

It's a fantastic suite overall. Kaspersky still has a little bit of work to do with updating the interface for touch – some clickable things in the settings are still tiny text – and it hasn't quite reached parity with BitDefender on features, but it's getting there.

Verdict

The anti-virus is flawless and the suite covers a lot of bases. The interface still needs a little work.

★★★★½



SECURITY SUITE

$99.95 FOR ONE USER ON UNLIMITED DEVICES. | MCAFEE.COM.AU

McAfee All Access

A multi-platform integrated solution with excellent anti-virus.

McAfee, soon to be known as Intel Security, has really picked up its game in the last year when it comes to virus protection. It's one of four suites to acquire a perfect overall rating from AV-Test, with the only non-perfect number on its scorecard a 98% on 0-day virus detection. It barely affected system performance and produced no false positives. (We should note that AV-Test benchmarked McAfee Internet Security, which uses the same engine as All Access).

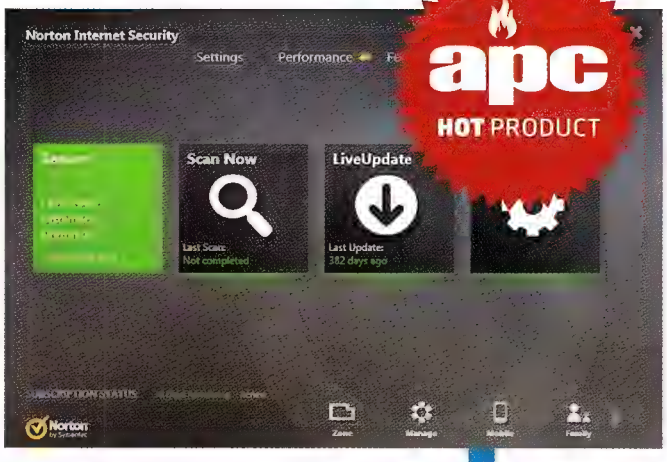
Installation on the PC is a laborious process, but once it's installed you can mostly forget it's there. It has excellent parental controls but lacks a couple of the deeper features of some of its competitors, like a sandbox or banking browser. It does have some handy extras like PC tuneup, online backup, a shredder and data encryption, as well as a built-in browser add-on password manager that will automatically sync your passwords across all devices connected to the account, including mobile devices. In fact, you can have as many devices as you like connected to the account. All Access has an unusual licensing model. You can install it on multiple PCs, and there's a rather less functional mobile version as well. But the base $99.95 license is for one user only; that is to say it's one user, but unlimited devices. All devices can be managed from a single online console.

We really like how McAfee has evolved its suite in the last year. It not quite on parity with the likes of BitDefender and Symantec yet, but the streamlining of the suite and improved anti-virus engine have done wonders.

Verdict

A suite built for the new multi-platform reality.

★★★★☆



SECURITY SUITE

$99.99 FOR 3 PCS FOR 1 YEAR | AU.NORTON.COM

Symantec Norton Internet Security

A suite that's better than ever.

Although it has been upgraded with a new coat of Windows 8 polish (along with funky spinning window transitions), this remains the Norton that we've been so impressed with for quite a few years now. It's smooth, easy to use, and asks very little of the user. It's a suite that's very subtle: there's a lot going on in the background with Symantec, but the user thankfully doesn't have to worry about it. Just install it and let it do its thing.

And its thing is really good. As we've come to expect from Symantec, the virus protection is excellent, achieving perfect detection scores in the AV-Test benchmarks and its only blemish was a single false-positive. It had no detectable impact on system performance, demonstrating once again that the old reputation of Norton being a system killer is long-since outdated.

The anti-virus is accompanied by a very rich feature set, including grade-A parental controls and an excellent plug-in password manager. It has scam detectors and web filters, a link scanner that flags links to suspect sites, identity theft protection, Facebook and identity protection, a recovery disk and system cleaner, a performance monitor, cloud storage and backup, multi-device management and quite a bit more. It really does cover your bases extremely well.

While we'd still put BitDefender ever so slightly ahead of it, Symantec still gets a perfect score from us. It's a suite with an excellent feature set and no real weaknesses. It's user-friendly and easy to manage on multiple PCs to boot.

Verdict

Near-perfect protection for your PC. It has a tremendous number of features.

★★★★★

AWESOME THING

$99.95 FOR 4 PCS FOR 1 YEAR | WWW.TRENDMICRO.COM.AU

Trend Micro Maximum Security 2015

Great for a family environment.

We've been critical in the past of Trend Micro's penchant for throwing a million features at us without any kind of integration or unity, but we have to say it has really turned it around in the latest version of the suite. It's much more usable now, with a friendly integrated interface and less need for user input into its operations.

That's not to say that the features aren't there. There are still a metric tonne of them. Web scanners, file encrypters, parental controls, online backup (5GB), a password manager, file shredder, file syncing tools, social networking defences, instant messaging filters, web site filters, credit number blockers and much more all come built in. There isn't really a major element of security that Trend Micro missed the boat on.

In spite of all of these features, the interface is quite accessible. It doesn't blend well with the style of Windows 8, but Trend Micro has done some great work in boiling down all of its features into a managable environment.

We should also note that we felt the parental controls, social networking and file protection were particularly strong, making this suite a great option for people with families. The centralised management console for other desktops and mobile devices is also a major boon for a family environment.

Its malware defences are still top-notch, too. It picked up every virus it was tested against, and the only slight marks against it were a couple of false positives and a slight decrease in system performance while it is running.

Verdict

A top choice that provides broad protection against all major threats.

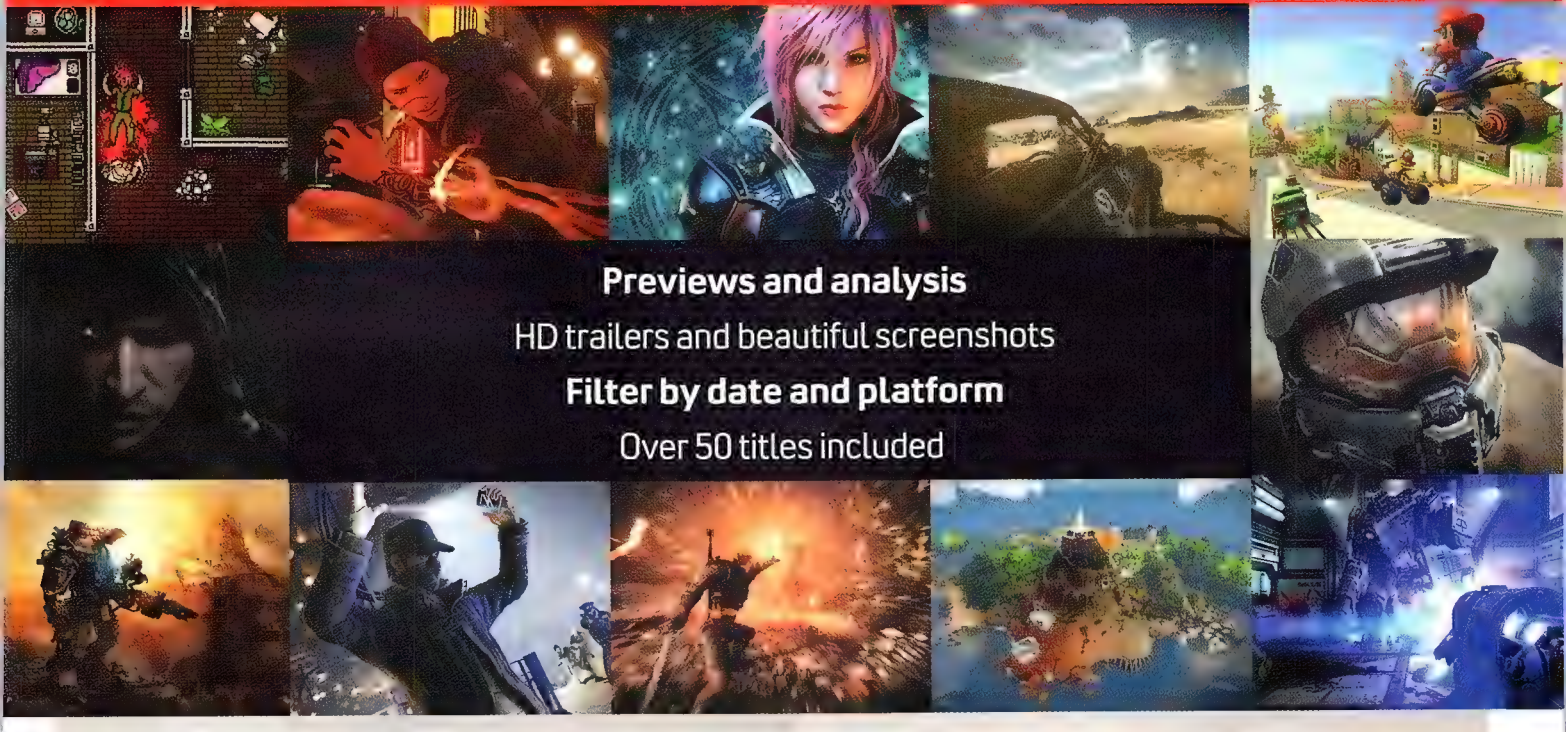
★★★★½

CVG AUSTRALIA PRESENTS

2014 GAMING GUIDE

ONLY $1.99

DOWNLOAD OUR FULLY INTERACTIVE PREVIEW OF THE BIGGEST GAMES OF THE YEAR!



Previews and analysis

HD trailers and beautiful screenshots

Filter by date and platform

Over 50 titles included

OUT NOW

www.computerandvideogames.com

Available on the App Store

Apple, the Apple logo and iPad are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

Secure your Android

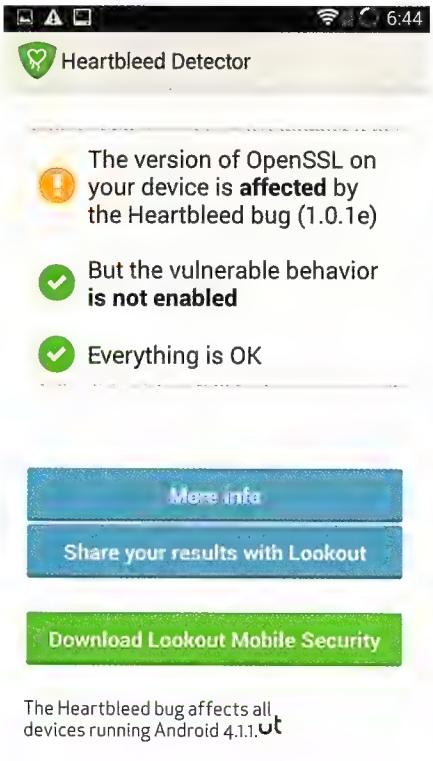
Is your Android tablet or smartphone safer than any other device where security is concerned? Darren Yates delves in to discover the things you need — and those you don't.

HTC's One X (pictured), EVO and One S have the Heartbleed bug, if unpatched.

No doubt the security software industry will remember 2014 with fondness, thanks to a seemingly endless flow of bad-news security bugs, holes and leaks. But while it might appear as though technology these days is about as secure as an open door, how much of the bad news is actually relevant to Android — and are your devices truly at risk?

GOOGLE VS SECURITY APP VENDORS

First, we need to paint the landscape — actually, when it comes to Google and security app vendors, its less 'landscape' and more 'battlefield'. Put simply, these guys don't seem to like each other very much. Google's director of open source, Chris DiBona, took the long handle to 'virus companies' in an infamous Google+ post back in November 2011, describing them as 'charlatans and scammers' (**tinyurl.com/nqofqhn**).


6:44
Heartbleed Detector
The version of OpenSSL on your device is affected by the Heartbleed bug (1.0.1e)
But the vulnerable behavior is not enabled
Everything is OK
More info
Share your results with Lookout
Download Lookout Mobile Security
The Heartbleed bug affects all devices running Android 4.1.1.

Meanwhile, there's been a stream of bad-news reports from security vendors about the amount of malware and threats Android users are now exposed to — and not surprisingly, the malware numbers are growing.

According to independent security software testing institute AV-TEST, the number of Android malware threats tripled in the year from June 2013 to June 2014 to over 2.6million (**tinyurl.com/oj6w2n8**). Earlier this year, US security vendor RiskIQ published a study claiming 42,000 apps on Google Play in 2013 contained malware capable of acts including swiping personal details to connecting to questionable ad networks (**tinyurl.com/ljp2vae**). And more recently, security software brand Trend Micro released a research paper claiming 77% of the top 50 free apps on Google Play (we don't understand the maths, either) now had a fake app alternative and half of those were deemed to be malicious (**tinyurl.com/jwchy9g**).

In the time since DiBona's original outburst, you may have thought this apparent increase in malware threats would have Google relenting and saying 'you know what, installing some security software mightn't be such a bad idea'. Don't bet on it — Google's chief security engineer, Adrian Ludwig, spoke to journalists ahead of this year's Google I/O developer's conference in July, saying he thought '99% plus' of Android users would not see any benefit from using anti-virus or similar apps, believing the security provided by Android is enough and that the risks are overstated (**tinyurl.com/odlj49w**).

McAfee Mobile Security scored top marks in AV-TEST's endurance test.

SO WHAT ARE THE RISKS?

Given the increasing vociferousness of the security software brigade, it's not surprising Google has its hackles up. Its view of Android security is seemingly quiet cocktails on a sun-drenched deserted beach, while security software vendors, in return, appear headed for the hill, crying 'imminent destruction'.

So should you be alert but not alarmed, or just head straight on into unbridled panic?

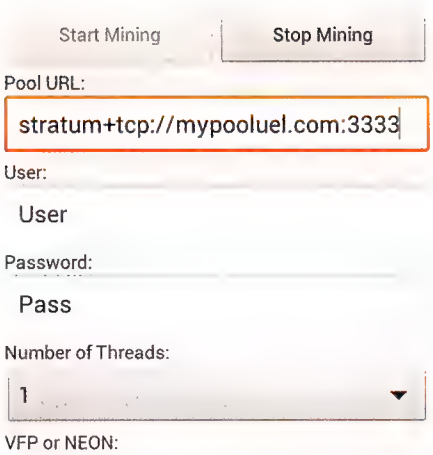
MALWARE

Arguably, the most serious threat to Android devices comes from directly-installed malware from unknown sources. Just what constitutes 'malware' varies depending on who's doing the talking, but typically, its software that either steals personal information or modifies your device in some way, whether that's signing you up to premium services, covertly mining for crypto-currencies like Bitcoin, or just straight-out extortion.

RANSOMWARE

Rightly, there's growing concern for this insidious new form of malware called ransomware. Initially pitching itself more towards 'scareware', infected apps would lock computer screens with claims of pornography law breaches and demands for payment of so-called 'fines'. But beyond that, from a data viewpoint, they were relatively harmless.

However, in recent months, nasty new versions such as CryptoLocker have emerged that are far more



LTC and Scrypt Miner Pro is a genuine coin-mining app on Google Play.

dangerous, encrypting the files on an infected system using AES-grade encryption, before demanding payment within a short time frame to supposedly receive the unlock key or risk losing the data forever.

Now the threat has arrived on Android devices – Simplocker (Android/Simplocker.I) lands on its victim device and searches through the external SD card, looking for a range of typical file extensions, encrypting those files, then locking the screen with an official-looking FBI-like notice, demands payment of $40 for the unlock key.

But there is some good news – at time of writing, the app isn't as sophisticated as CryptoLocker, using a hardcoded encryption key, which allows for a relatively simple and free decryption process available in app-form from anti-virus vendors such as Avast.

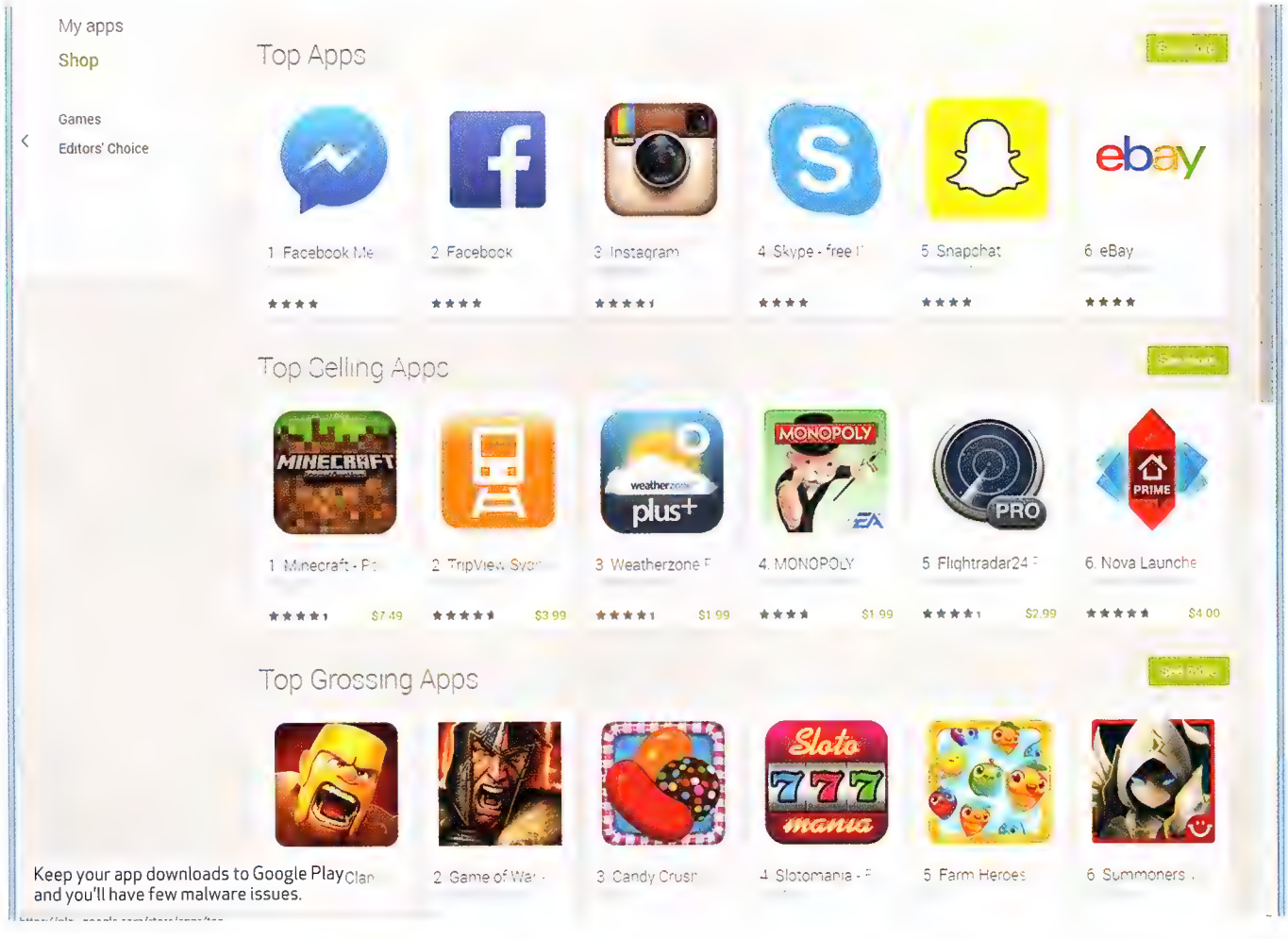
Closer to home, over 6,000 Australians have been stung by the 'Koler' ransomware app, according to research from Kaspersky Labs. The malware has targeted users in 31 countries and delivers a 'sting' message purporting to be from local law enforcement agencies including, strangely, the Royal Australian Corps of Military Police. It seems to then convince users to install a malware app on their device (**tinyurl.com/ockc2c8**).

Thankfully, Koler appears to be little more than 'scareware' – it doesn't encrypt anything. But it does give an insight into how malware is increasingly distributed – rogue web sites that convince users to follow a trail that leads to unwittingly installing malware apps. Simplocker shows off the common alternative – malware masquerading as legitimate apps but on unofficial Android app stores. Importantly from all of this, there have been no reports of ransomware being found on Google Play, lending weight so far to the 'green light' Google view of Android security.

CRYPTOCURRENCY MINING APPS

However, while ransomware may not have found a home on Google Play, that hasn't stopped other 'enterprising' malware apps from reportedly sneaking in. Cryptocurrency-mining apps like BadLepricon 'borrow' the CPU power of infected devices, turning them into drone miners of cryptocurrencies such as Bitcoin and its cousins, Litecoin and Dogecoin, without the user's knowledge. And naturally, the device owner isn't the recipient of coins mined.

Some of these apps appear to be quite clever – coin-mining requires plenty of CPU power, but so as to allay suspicion, the apps typically only work when the battery capacity is greater than 50% and don't work continuously, so as to stop the phone from overheating too obviously.



The disturbing part of this particular scam is the claim that these stealth-mining apps were found on Google Play earlier this year. BadLepricon was said to have made its way inside via half-a-dozen wallpaper apps, each with fewer than 500 downloads. But according to Ars Technica, two other apps, Prized and Songs – the latter with between one and five million downloads – were also overtaking devices, covertly mining coin. Both appear to have since been removed (**tinyurl.com/pbcarta**).

THE FBI
Ransomware apps have now hit Android devices.
FBI CRIMINAL INVESTIGATION
TextView
US
This device is locked due to the violation of the federal laws of the United States of America
• Article 161
• Article 148
• Article 215
• Article 301
•of the Criminal Code of USA
Your device was used to visit websites containing pornography
Following violations were detected
• Child pornography
• Zoophilia pornography
• Child abuse
• Bulk-spamming
Tour device also contains:

Interestingly though, while Google's Adrian Ludwig has concerns about coin-mining apps and non-disclosure of functionality, he told *Time* magazine he sees them as an innovation you couldn't have on a platform that 'blocks apps first and allows later' (**tinyurl.com/o9akk7x**). Personally, I'd prefer to know if an app was about to set up my device as its own coin-cutter.

IS THE MALWARE THREAT REAL?

The problem when it comes to security is that everyone naturally has a vested interest in their side of the story – Google to play down any threat just as hard as security software vendors talk up anything that smells remotely like malware. Figuring out the true state of the malware threat can be a bit like straddling a chasm.

On balance though, we think the reality is closer to the middle, but still well in Google's favour. While there can never be a perfectly secure system and there'll always be a few dodgy apps hit Google Play, the huge numbers of threats purported to exist by the security app vendors are almost always outside the official apps store and seem to invariably involve tricking users into installing apps from unknown sources (or 'sideloading').

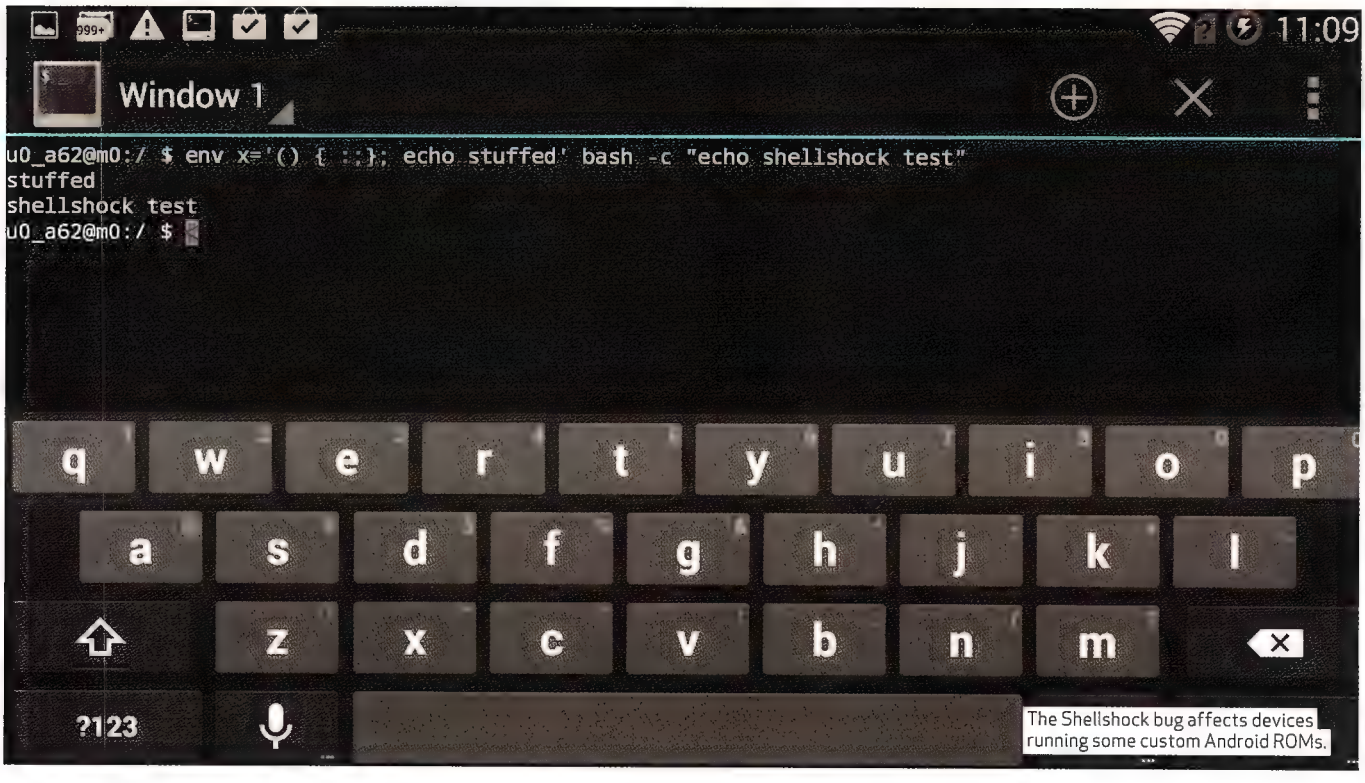
For the average user who has a non-rooted phone, only downloads popular apps from Google Play and doesn't side-load from questionable sources, the risks do look overstated – not zero, but overstated. If they were zero, Google wouldn't have rolled out this past April a new low-profile on-device app scanner extension to its Google Play Services, sniffing around for already-installed apps exhibiting dodgy behaviour. The new scanner is available on all devices running Android 2.2/Frozen Yoghurt or later with recent Google Play updates.

SECURITY SUITES TESTED

If you're still feeling nervous, there's no shortage of security apps available on Google Play to sandbag your device with, but according to the latest independent research from AV-TEST, not all of them are worth the time of day. AV-TEST performs endurance testing, checking the ability of security software to detect some 2300 pieces of malware on a three-pass test. The most recent test of 36 Android security apps between January and June this year found only 14 returning with a 100% detection rate:

- Ahnlab V3 Mobile
- Antiy AVL
- Avira Free Android Security
- Bitdefender Mobile Security
- Cheetah Mobile Mobile Security, Clean Master and CM Security
- G Data Internet Security
- Kaspersky Internet Security
- McAfee Mobile Security
- Qihoo 360 MobileSecurity
- Symantec Norton Mobile Security
- Trend Micro Mobile Security
- TrustGo Mobile Security

Of those 14, eight received top marks for usability – Ahnlab, Cheetah Mobile (all three), McAfee, Qihoo, Trend Micro



The Shellshock bug affects devices running some custom Android ROMs.

and TrustGo (**tinyurl.com/oj6w2n8**). But if you're going to consider using any security software, we recommend looking at freeware options first, before you start heading for the payware aisles.

WHAT ABOUT HEARTBLEED?

Compared to malware, Heartbleed is actually a more urgent issue – you have to invite malware on-board your Android device, but for some devices, Heartbleed is already built-in.

The Heartbleed bug is a flaw in the OpenSSL (Secure Sockets Layer) security protocol used to securely link two devices, the flaw allowing either device to read more data from the other than originally intended, potentially including user passwords and other data in memory. What's more, only one of the two devices needs to have the flaw in order to be exploited.

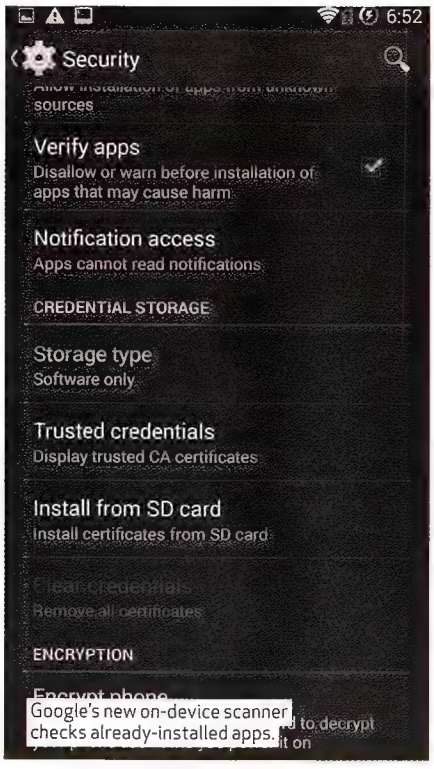
As far as Heartbleed affecting Android specifically, all devices running Android 4.1.1/Jelly Bean look to be in trouble and there are suggestions a few using a customized 4.2.2 ROM may also be affected. While Google has patched the flaw at its end with various updates (**tinyurl.com/kxbmgj4**), it requires phone makers/network providers to push those updates to devices from their end to fully plug the leak.

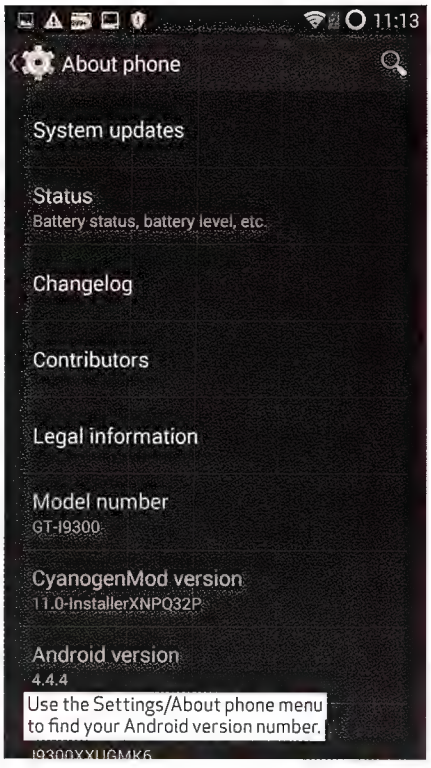
Bottom line, if you can find an Android update that gets your device off 4.1.1 and onto at least 4.1.2, you should install it as soon as possible. If you can't find a suitable ROM, the advice is – don't use that device for internet banking or personal messages. Right at the minute, Google's own data says just over a quarter of all Android devices are still running some form of Android 4.1, so it's still a sizeable chunk of the market potentially affected (**tinyurl.com/qfquw3s**). And in a heavy dose of irony, Heartbleed is one flaw the security app vendors can't fix, so don't bother looking for an app cure. Instead, if you're not sure you're affected, search out the Heartbleed Detector app from Lookout or McAfee on Google Play.

SHELLSHOCK

The most recent security panic that's still reverberating around the globe at time of writing is the so-called 'Shellshock' bash bug, which looks to have caught all by surprise as everyone from Linux brands to NAS makers scrambles to patch and update affected code.

Shellshock is a vulnerability in the Linux 'bash' command-line/script app unwittingly added in 1992, but only discovered in late-September this year. The bug allows hackers to launch clandestine commands, potentially





taking control of a device and is now listed under the Common Vulnerabilities and Exposures (CVE) database as CVE-2014-6271.

The ramifications of Shellshock and its exploit simplicity could make Heartbleed look like a spelling mistake. Within hours of its announcement, Shellshock attacks on computers susceptible to the bug had begun around the world, including NAS boxes from QNAP and Synology (both of which are now urging users to update firmware).

Android is a modified version of Linux, so naturally, there's concern it's also affected by the bug. After our own investigation, we can say it is – and it isn't.

HOW TO TEST FOR SHELLSHOCK

Testing for Shellshock is easy enough – just fire up a Terminal command prompt on your Linux computer and run the following code:

```
env x='() { :;}; echo
stuffed' bash -c "echo
shellshock test"
```

If you see the word 'stuffed' printed above 'shellshock test' after running that code line, your device has the Shellshock bug.

Normally, this would be a bug limited to Linux-based systems, but it turns out if you're running a rooted Android device, you could also be affected. My rooted Samsung Galaxy S3 phone runs CyanogenMod 11.0 (Android 4.4.4/KitKat) Aug 5 build OS and running the code script above produced 'stuffed'.

While that technically makes the device vulnerable, it's only vulnerable because a) I rooted the phone in the first place and b) installed a version of CyanogenMod that came with the affected Bash app. Stock Android ROMs do not include Bash – Google has used the mksh shell alternative since Android 3.0/Honeycomb (**tinyurl.com/nuuqw85**), while other versions are known to use the BusyBox/ash alternative. That means if you're using your Android device in its original condition (that is, original ROM, no root access), there shouldn't be anything to worry about.

And if you are running CyanogenMod 11, the CyanogenMod team has had nightly patches available since September 26 that plug the hole, so if you haven't already, make sure you update your device.

AND ASIO?

Of course, all this talk of security is overshadowed by recent changes to federal anti-terrorism laws that grant unprecedented powers to the Australian Security Intelligence Organisation. Concerns are, even among some politicians, that it would take just a single warrant and the local internet belongs to ASIO (**tinyurl.com/p7jfs71**).

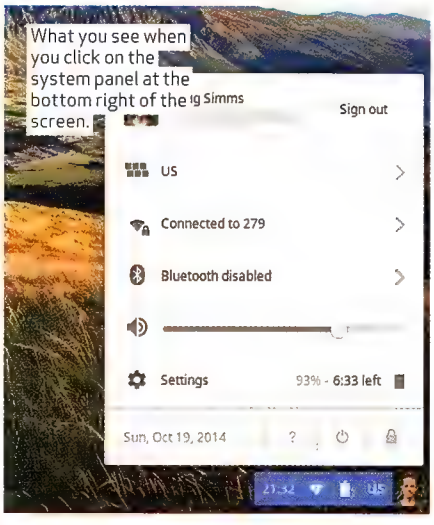
Unfortunately, no amount of security software or patches is likely to fix that. ■

Chromebooks go primetime

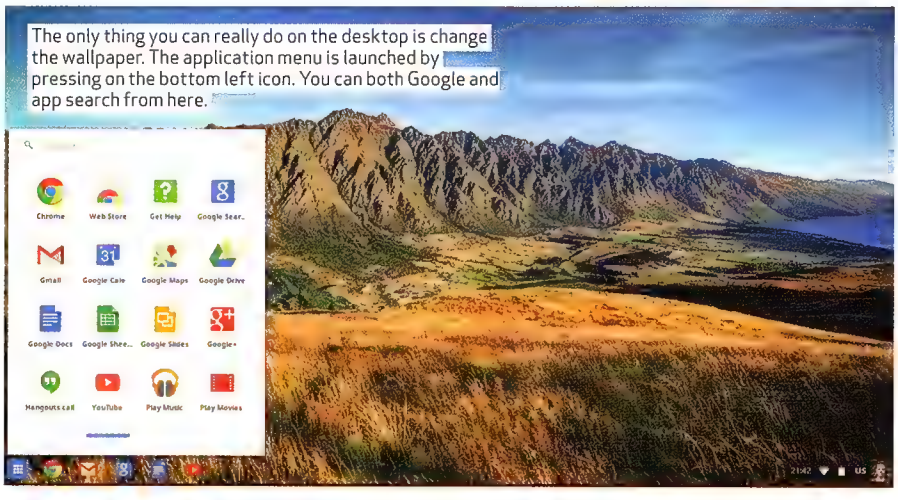
Google's low-cost PCs are everywhere, but can they really replace your laptop or desktop? Craig Simms tests six ChromeOS-powered units and finds out that, for better or worse, there's still no place like Chrome...

Mobile devices are in flux. The laptop has been under pressure for some time from smartphones and tablets, pushing prices down and splitting the market into distinct budget and high performance categories. In 2015, we'll finally see delivery on the promise of combining laptop and tablet, with technology allowing thin enough form factors that neither mode is compromised. What this does to the tablet market will be fascinating to watch.

Calculator is one of the few included apps that doesn't run in a tab of the browser.



What you see when you click on the system panel at the bottom right of the screen.


The only thing you can really do on the desktop is change the wallpaper. The application menu is launched by pressing on the bottom left icon. You can both Google and app search from here.

Then you have the 'Internet of Things', the idea that everything will contain a computer of some sort connected to the cloud – threatening to remove the need for some devices. Certainly the time is ripe for disruption.

Google's disruption to traditional PCs – the Chromebook – has been quietly developing for some time now. It's exactly as it sounds: a notebook running a version of the Chrome browser, that's mutated into an entire operating system – ChromeOS. The idea is simple: if everything is moving online, why not make the browser the whole system?

While most of its "apps" are simple bookmarks to web sites, some are standalone thanks to the wonders of Google's Native Client, and online applications are becoming more powerful by the day. ChromeOS is starting to expand into other areas too, with Google recently enabling authorised Android apps – although at the time of writing that's a small list, limited to DuoLingo, Evernote, Sight Words and Vine. Even Adobe will be joining in, with a version of Photoshop that "streams" from the cloud.

IS THE CHROMEBOOK FOR ME?

It should go without saying that a Google notebook relies heavily on the internet. If you don't spend most of your time within Google's ecosystem, within range of a decent internet connection, and enjoy the flexibility and power of Windows, OS X or Linux – then ChromeOS simply isn't for you. Even something as simple as running Skype is out of the question: you'll need to use Google Hangouts.

For those who live and breathe Google, or are invested in the web, the appeal of the Chromebook is apparent. You log in with your Google account, and settings, apps and extensions follow you from place to place regardless of what machine you've logged into. There's offline access to your Google Drive account, and many Chromebooks offer 100GB storage online for 2 years.

This profile portability, combined with low cost, could make Chromebooks appealing for certain businesses or education.

Power users and the technically minded may struggle with the low-specced machines and lack of flexibility. There's also a level of polish missing. For instance, there's often a small, but notable lag between typing and letters appearing on screen, depending on the hardware spec and what else you're doing at the time.

Chromebooks also don't gracefully hibernate when they lose charge – they remember the apps that were open, but nothing else. You can sort of get around this in the browser itself by setting it to reload tabs where you left off, but apps like calculator won't remember their current state.

As a general rule, the more you want to do without the assistance of the internet, the less a Chromebook will accommodate you.

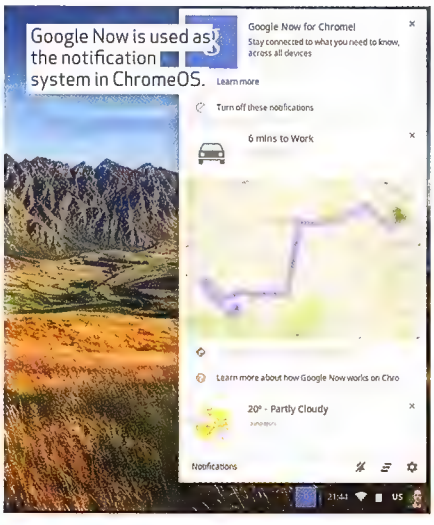
File management, for instance, is limited to only your Downloads folder and Google Drive. In an effort to move everything online, local storage is

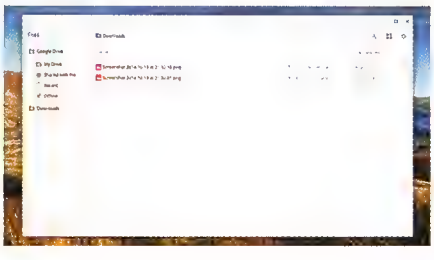
usually only around 16GB. You can plug in USB thumb drives, and impressively ChromeOS will read from and write to NTFS drives, and even read from HFS+ drives. While you can connect an external optical drive, don't expect CDs or DVDs to play: it's a data only device.

The ChromeOS video player is incredibly basic, and can't be independently launched: you have to double click a file from the file manager to open it. While it covers a decent smattering of formats like AVI, MOV, MP4, MKV and OGM, it doesn't support all codecs within those containers, often resulting in the file not playing, sound without video, or vice versa.

The music player can be best described as functional, with shuffle and repeat options, but no playlist building or re-ordering. The best you can do is open a music file, and then files in the same folder are treated as the playlist. Audiophiles will appreciate the ability to play back FLAC files, but it's clear Google wants you to build your library online through Google Play Music or Google Play Movies. Those with existing, large media libraries thinking about a purchase may need to consider building a media centre and using Plex to stream everything.

Despite this, it's important to note functionality can and does change quickly with Chromebooks. Just like Chrome, ChromeOS is updated rapidly. And if you find yourself missing Windows, OS X or Linux, you can always access your existing systems through the Chrome Remote Desktop Extension. Our Windows 8.1 test system worked flawlessly over the local network, although functionality was limited, with file transfer not possible, audio not hooked and sending system keys other than Print Screen not supported.


Google Now is used as the notification system in ChromeOS.
Google Now for Chrome!
Stay connected to what you need to know, across all devices
Learn more
Turn off these notifications
6 mins to Work
Learn more about how Google Now works on Chro
20° - Partly Cloudy
Notifications



You can still copy, cut, paste, rename, delete, create new folders and even zip files — but ChromeOS' Files app is still limited.

HARDWARE HEADACHES

Choosing a Chromebook can be hard due to the disparate hardware available. It's not as simple as just looking at the GHz, considering there are Celerons, Core, Exynos and Tegra chips out there.

In general day to day use, each Chromebook handled basic web browsing tasks like email, Facebook and Google Drive acceptably, even with around 20 tabs open. Flash games didn't fare well, with the basic *Clickerheroes* taxing the more powerful machines.

While the Peacekeeper and Sunspider benchmarks we performed do provide raw numbers to compare with, the best indicator we found of usability was running *Angry Birds* Chrome and a 720p, 1080p and 4k video locally on each laptop. 4k video is absolutely unfair and unsuitable on laptops of this performance bracket, but it certainly does separate CPU capability.

Finally, battery was tested by streaming a 720p, 3Mbps video over Wi-Fi using Plex until exhaustion.

Chromebook quickstart tips

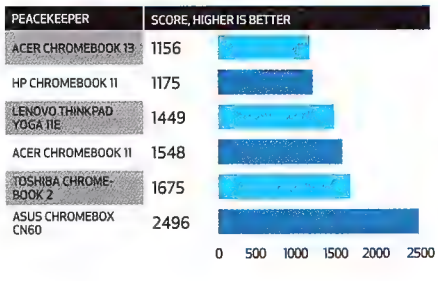
- Heading to **chrome://quota-internals** in your browser will tell you exactly how much space is left on your local storage.
- Right clicking an app allows you to choose whether it always runs as a tab, or in windowed mode.
- Make sure to head to the Users section under Settings, and enforce a password lock when the laptop wakes up from sleep.
- There's a whole host of keyboard and touchpad shortcuts too:

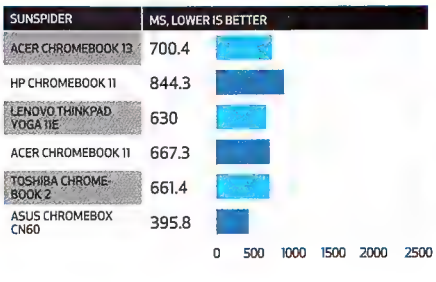
Swiping with two fingers: scroll
Simultaneous double finger tap, or Alt + tap: right click
Caps lock: Alt-Search
Home/End: Ctrl-Alt-Up/Down arrow
Page Up/Down: Alt-Up/Down arrow
Lock the Chromebook: Ctrl-Shift-L
Delete: Alt-Backspace
File Manager: Shift-Alt-M

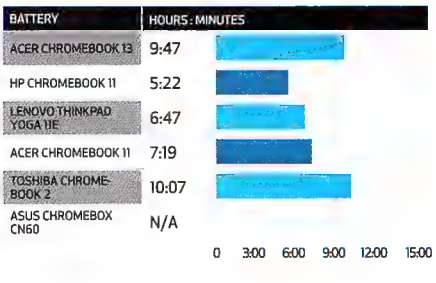
REAL-WORLD PERFORMANCE TESTS

	ACER CHROMEBOOK 11	ACER CHROMEBOOK 13	ASUS CHROMEBOX CN60	LENOVO THINKPAD YOGA 11E	HP CHROMEBOOK 11	TOSHIBA CHROME-BOOK 2
ANGRY BIRDS	RARE FRAME RATE ISSUES	OCCASIONAL FRAME RATE ISSUES	NO FRAME RATE ISSUES	FRAME RATE ISSUES MAKE IT DIFFICULT TO PLAY	OCCASIONAL HEAVY SLOW DOWNS	OCCASIONAL FRAME RATE ISSUES
720P VIDEO	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS
1080P VIDEO	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS	FLAWLESS
4K VIDEO	CONSISTENT STUTTERING	UNWATCHABLE	CONSISTENT STUTTERING	UNWATCHABLE	CONSISTENT STUTTERING	CONSISTENT STUTTERING

LABS BENCHMARK RESULTS


PEACEKEEPER
SCORE, HIGHER IS BETTER
ACER CHROMEBOOK 13 1156
HP CHROMEBOOK 11 1175
LENOVO THINKPAD YOGA 11E 1449
ACER CHROMEBOOK 11 1548
TOSHIBA CHROME-BOOK 2 1675
ASUS CHROMEBOX CN60 2496
0 500 1000 1500 2000 2500


SUNSPIDER
MS, LOWER IS BETTER
ACER CHROMEBOOK 13 700.4
HP CHROMEBOOK 11 844.3
LENOVO THINKPAD YOGA 11E 630
ACER CHROMEBOOK 11 667.3
TOSHIBA CHROME-BOOK 2 661.4
ASUS CHROMEBOX CN60 395.8
0 500 1000 1500 2000 2500



CHROMEBOOK

$329 | WWW.ACER.COM.AU
Intel Celeron N2830 @ 2.16GHz (dual core), 2GB RAM, 16GB SSD, 1366x768, 802.11ac.

Acer Chromebook 11 (CB3-111)

The standard to beat.

Unlike its 13-inch model, Acer's tapped Intel's Bay Trail-based Celeron N2830 for its 11-inch Chromebook. As a result it manages to outperform the 13 on the CPU front, but not GPU. In day-to-day web browsing experiences, you honestly don't notice that much of a difference.

It is almost a shrunk-down version of its bigger brother, offering the same USB 3.0, USB 2.0, HDMI and a headphone jack for IO, and the step up 802.11ac. Just like the other Chromebooks, you get 100GB of storage on Google Drive for two years.

In a way Acer has been less ambitious here: the unit is back to 2GB RAM and 16GB SSD, but arguably on a Chromebook you don't need any more.

The TN-based screen is also back to the widely available 1,366 x 768 here, but it's bright and is at home on an 11-inch screen. Even with the reduced chassis size, speakers continue to be a cut above the competition, with sound more tonally full and appealing. The keyboard and touchpad are excellent, and once again it feels like you're getting great build quality for the price.

Apart from the usual caveats that come with owning a ChromeOS device and its capability therein, there's very little to complain about here. Acer's 11-inch Chromebook is the best performing in its screen-size category, providing good CPU results and the best battery life. If you're thinking Chromebook and 11-inch, this is your go-to device.

Verdict

Acer's really set the bar with this compact 11-inch model, with great build quality at an affordable price.

★★★★

CHROMEBOOK

$379 | WWW.ACER.COM.AU
Nvidia Tegra K1 @ 2.1GHz (quad core), 4GB RAM, 32GB SSD, 1920x1080, 802.11ac..

Acer Chromebook 13 (CB5-311)

Tegra's rebirth.

Acer is attempting to stand out from the pack, with a stylish white Chromebook. It also comes with 802.11ac, 4GB of RAM instead of the standard two, a 32GB SSD, two USB 3.0 ports instead of just one and the jewel in the crown – a Full HD screen.

The latter is only TN-based, meaning vertical viewing angles aren't the best, but the extra resolution sure does make a difference. Sound is also excellent, by far providing the best speakers of the bunch. Like the Toshiba it feels significantly nicer than the price bracket it's in. Battery life is decent too, almost reaching 10 hours.

Aside from USB, you get the standard trappings of an SD card reader, headphone jack, HDMI port and 100GB of Google Drive storage for two years.

Sadly the 13-inch Acer didn't perform well in the Peacekeeper or Sunspider tests, and 4k struggled the most here, showing that the Tegra isn't the strongest CPU of the bunch.

It is the strongest GPU however, as one would expect from Nvidia. While we find online WebGL benchmarks aren't the most consistent, the results would regularly double even those from the most powerful Intel chip in the roundup.

Native Client games like *Bastion* won't run on Nvidia's architecture either, and ChromeOS, let alone the web isn't a strong area for 3D. Perhaps as Android and ChromeOS get closer there'll be more pressing need.

Verdict

We love the 1080p screen, build quality and the sound. Better performance would make it shine.

★★★½

CHROMEBOX

$279 | WWW.ASUS.COM/AU
Intel Celeron 2955U @ 1.4GHz (dual core), 2GB RAM, 16GB SSD.

ASUS Chromebox (M039U)

A quiet and subtle desktop.

The CN60 is almost a NUC – about 127 x 123 x 40mm in size, and running off Intel hardware. While there are Core i3 and even Core i7 versions of the CN60 out on the market, the focus of ChromeOS hardware tends to be lower performance machines that keep cost down. As such, we received the Celeron 2955U model for review.

As a Chromebox, it has a few trappings Chromebooks usually don't – a gigabit Ethernet jack, for instance. Those who rely on Wi-Fi need not worry, as you'll get dual band here as well. It also has an SD/MMC card reader, DisplayPort, HDMI, four USB 3.0 ports, and a headphone jack.

The power button is on the angular corner, with a white LED signalling that the unit is on. The power unit itself is broken out into an independent 75 x 75 x 30mm adapter.

A nice option is the inclusion of a VESA monitor bracket in the box. Combined with the included screws, the Chromebox can be attached neatly to the back of many monitors, keeping things hidden and neat. Like other vendors, ASUS offers 100GB free storage on Google Drive for two years.

Using a Haswell ULT Celeron, the ASUS provided the best performance of all the Chrome machines, although we'd expect this in a desktop form factor. We can see the ASUS Chromebox addressing the needs of some classrooms or finding use as secondary web browsing box in some homes – perhaps even hooked up to a TV somewhere.

Verdict

ASUS' Chromebox could find a home as a secondary web PC.

★★★★☆

CHROMEBOOK

$399 | WWW.HP.COM.AU
Samsung Exynos 5 (dual core), 2GB RAM, 16GB SSD, 1,366 x 768.

HP Chromebook 11 (2002TU)

An underwhelming attempt.

HP's Chromebook 11 starts well enough, in a pleasing turquoise colour and silver interior with white keyboard. If you prefer, there's also a white version available.

It quickly becomes obvious though that the Samsung Exynos 5 inside isn't as good friends with ChromeOS as its Intel compatriots, with performance being a noticeable issue.

Battery life is short even for an 11-inch, with the competition trouncing the HP by over an hour. The touchpad on our system was erratic, and when we inserted a USB drive, we had to close the lid and re-open it to get it to register. It's entirely possible these were problems with our review unit alone, but be aware.

The TN-based, 1366 x 768, 11.6-inch screen does the job, while the keyboard is pleasant enough to use. There's no USB 3.0 here, with HP supplying two USB 2.0 ports instead. You get a headphone jack, and that's it apart from the micro USB port used for charging. Given the ubiquity of micro USB, this is a pretty nifty idea.

The problem though comes down to amperage. HP includes a 3A charger – if you hook up a 2A or less, the Chromebook warns you that it likely won't increase charge unless turned off.

We don't know if the Exynos just isn't ready for these workloads, or if ChromeOS isn't optimised towards the chip: either way, there are better options available.

Verdict

The weakest performer of the bunch, for $400 you're better off looking to alternatives.

★★½☆☆

CHROMEBOOK

$599 | WWW.LENOVO.COM.AU
Intel Celeron N2930 @ 1.83GHz (quad core), 2GB RAM, 16GB SSD, 1366 x 768.

Lenovo ThinkPad Yoga 11e Chromebook

Almost stretches far enough.

The Yoga has a touchscreen and double jointed hinge, allowing the screen to fold around the back and act as a tablet – albeit a thick and weighty one at 22.mm high and 1.4kg.

Although the keyboard does get in the way, it is disabled in this mode, with an onscreen keyboard used instead. The only notable change for touch ChromeOS is the apps menu appears in the middle of the screen.

Lenovo's 11.6-inch IPS screen is a highlight. Although only 1366 x 768, it is uniquely glossy, with richer colours and better viewing angles. Sound doesn't fare so well, with the speakers best described as functional.

Port complement is standard, with one USB 2.0, one USB 3.0, an SD card reader, headphone jack and HDMI. Uniquely, Lenovo includes a hardware volume rocker on the side in addition to the standard keyboard keys.

The keyboard is top notch, although the touchpad doesn't fare so well. Movement is fine, but tapping makes an awful clack noise, and the trackpad travels too much when doing so.

Despite being quad core the Celeron chip struggled when playing *Angry Birds*, the game sometimes slowing down heavily during physics interactions. Considering the size and the touch screen, the battery did reasonably well, although was bested by Acer's 11-inch competition by over half an hour.

While it does have unique points of difference, we feel this doesn't translate into value when you consider the market positioning against the cost.

Verdict

It's hard to justify the price considering the limited applications.

★★★☆☆

CHROMEBOOK

$449 | WWW.MYTOSHIBA.COM.AU
Intel Celeron N2840 @ 2.16GHz (dual core), 2GB RAM, 16GB SSD, 1366 x 768.

Toshiba Chromebook 2 (CB30-B)

Silvering the Chrome.

We have to say we enjoyed our time with Toshiba's Chromebook 2 the most. Apart from being one of the higher performing machines thanks to its high-spec Bay Trail Celeron CPU, the battery life was top notch. Its lid is a stippled, textured silver, its base the same but in white, while the interior makes a good approximation of powdered silver.

As a point of difference, the Skullcandy-branded speakers are loud, but overly harsh on the treble and missing a lot of mid-range. We actually found Acer's 13-inch Chromebook to have superior tonal quality.

The 13-inch, 1366 x 768 TN-based matte screen is bright and colourful, although as with all TN screens viewing angles, especially vertical, aren't the best. Considering this is a budget laptop, it does well.

Toshiba decks their machine out with one USB 3.0 and one USB 2.0 port, an SD card reader, headphone jack and an HDMI port. The keyboard has excellent response, with the overall package feeling much better than the price it sells for.

Just like its competitors, buying the Toshiba will get you 100GB on Google Drive for two years, and it sports the stock standard 2GB RAM and 16GB flash storage. On top of the expected Bluetooth, Toshiba has upspecced and given the user dual band, 802.11AC for Wi-Fi.

The Toshiba Chromebook 2 was the smoothest experience of the roundup. If you're at all curious about Chromebooks, this is the one to try.

Verdict

We found the Toshiba to be the pick of the bunch in this roundup.

★★★★☆

THE HISTORY, THE HEART, THE HERO...

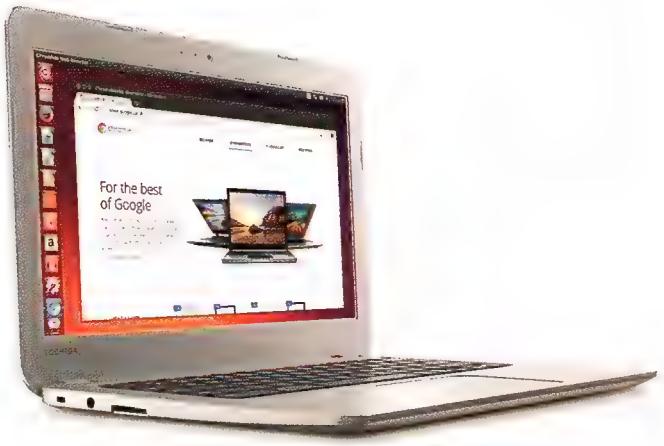
AUSTRALIA & NEW ZEALAND
XBOX
THE OFFICIAL MAGAZINE
PRESENTS
132 PAGES!
HALO
HALO 5: GUARDIANS
EVERY SCREEN AND DETAIL REVEALED!
THE MASTER CHIEF STORY
YOUR ESSENTIAL GUIDE TO THE BIGGEST GAME ON XBOX
THE ORIGINS
From Mac demo to industry giant
THE SECRETS
Unmissable tips and secrets you must try!
THE CREATORS
Exclusive access to the new Halo super-studio
THE REMAKE
The new features in The Master Chief Collection
PLUS: WHEN HALO INVADED A COUNTRY ⟐ THE BEST MULTIPLAYER MAPS
MEET THE VOICE OF MASTER CHIEF ⟐ THE IMPOSSIBLE WARTHOG STUNT ⟐ MORE!

Everything you need to know about Xbox's biggest and best title!

// SECRETS OF THE SERIES EXPOSED
// BEHIND-THE-SCENES INTERVIEWS
// ESSENTIAL TIPS AND TRICKS
AND MUCH MORE!

OUT NOW
ONLY $19.95!

Install Linux on your Chromebook



For those who've bought a Chromebook and miss a full OS, Neil Bothwick shows you how to get an assortment of Linux distros up and running.

Chrome OS is brilliant – for the type of user the Chromebooks are generally aimed at, it does exactly what it needs to do. It is fast and easy to use – what more could you ask for? Well, after a while, you may find yourself missing some of the features associated with more traditional operating systems. But don't fret, because help is at hand, in the form of Crouton.

Crouton is a set of programs that set up a chroot environment within Chrome OS, from which you can run a Linux OS, with Debian and Ubuntu currently supported. A chroot is not the same as a virtual machine – you are still running on the standard operating system, but within a new environment. This method has several key advantages: for example, it does not touch the existing OS installation, making reversal easy; it uses the Chrome OS drivers for video, wireless and other devices, so there are no compatibility issues; and it is written by the Chrome OS authors, so it should remain compatible with future updates. The only real disadvantage to using Crouton is that there may be a slight performance hit, but you didn't buy a Chromebook for its blazing speed anyway. Oh, and in case you're interested, the name Crouton is a convoluted acronym (standing for ChRomium Os Universal chrooT EnvirONment) that was clearly thought up after the name.

Before you start installing other distros, it's a good idea to create a rescue disk to restore your Chromebook should anything go awry. Even if you're not installing another OS, this is a wise step to take, especially as it's so simple – all you need is a USB stick or SD card of at least 2GB in capacity. Because of the cloud-based nature of Chrome OS, 2GB is enough, because you only need to back up the operating system – your data and settings are safe on Google's servers. (See the Recovery disks walkthrough on p65 for details.)

SHELL SHOCKED

When you're ready, start downloading Crouton from **http://goo.gl/fd3zc**. This is a script that downloads and installs everything you need. You run it from a shell – yes, Chromebooks come with a shell. Press Ctrl-Alt-T to open the Crosh shell in a browser tab. This is a limited shell, but run `shell` to start a proper Bash shell. Crouton needs to know which distro you want to install; it calls these releases and selects them with the -r option. Then it needs to know the target environment you want to install. A target is a collection of software packages, such as a particular desktop. These two commands will list the options:

```
sh -e ~/Downloads/crouton
-r list
sh -e ~/Downloads/crouton
-t list 2>&1 | more
```

The second command needs to be passed to more because it is several screenfuls – hit Space to page through them all. Once you've decided the release and target you want, you can run Crouton. To install Ubuntu 13.10 (Saucy Salamander) with the Unity desktop, for example, run:

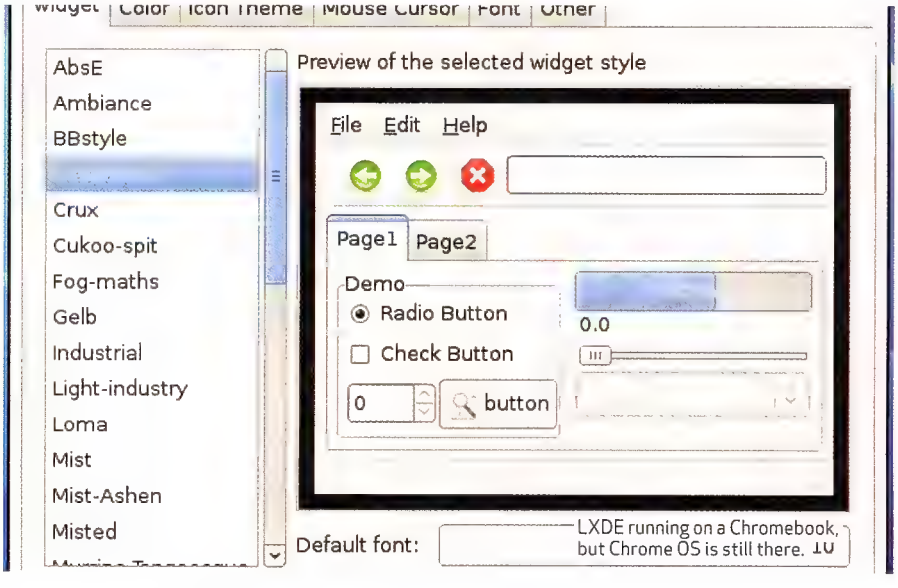
```
sudo sh -e ~/Downloads/
crouton -r saucy -t unity
```

This uses sudo because you need root to install the software. You can also specify multiple targets, like this example that installs Debian Wheezy with the LXDE desktop and the XBMC media centre:

```
sudo sh -e ~/Downloads/
crouton -r \wheezy -t
lxde,xbmc
```

STARTING UP

Depending on the target(s) selected and the speed of your internet connection, this could take a while. When it has finished, it tells you the command needed to start your chosen distro in

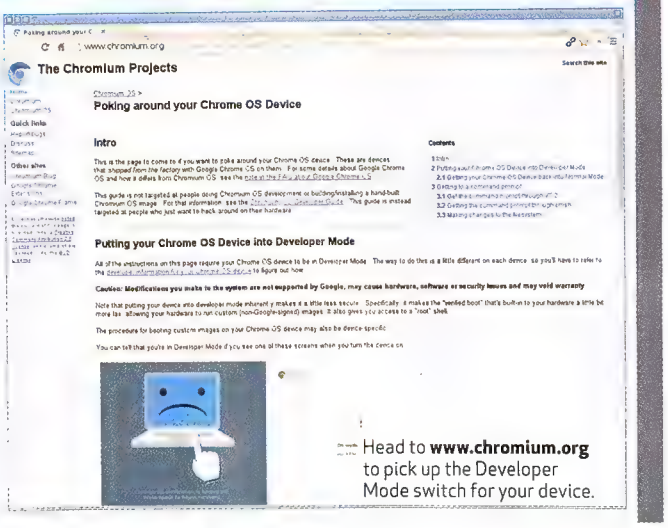


Quick tip

When trying multiple distros or targets, clean out any you have finished with. At several GB each, your storage will soon disappear.

Enabling Developer Mode

Using Crouton means putting your Chromebook into Developer Mode, in which you get root access and even a Bash shell. This isn't a hack, but a fully supported, if hidden, official option. A warning to start with: enabling Developer Mode wipes your storage. It doesn't affect your cloud storage but any files stored locally should be uploaded to Google Drive before you proceed. The method of enabling developer mode is device-specific — you can find instructions at the Chromium web site here: **tinyurl.com/cps49f6**. On the Acer C720 we used for testing, as with most Samsung devices, you turn the device off and then hold down Escape and Refresh keys before pressing the power button. This gets you into the recovery screen, then press Ctrl-D to enable Developer Mode. Other devices have a hardware button for this. Once Developer Mode is enabled, you will see the OS verification is OFF screen each time you turn on — press Ctrl-D to continue booting, or wait 30 seconds.



Head to **www.chromium.org** to pick up the Developer Mode switch for your device.

the chroot, such as: `sudo startunity`.

Run that command and you will be in a standard Ubuntu desktop. When you have finished, log out in the usual way and you go back to the familiar Chrome OS. You can switch between the two by holding Ctrl-Alt-Shift and pressing Forward or Back, too. In fact, the Chrome OS navigation keys above the numeric row are treated as the F keys by Linux, so these are really Ctrl-Alt-Shift-F1 and Ctrl-Alt-Shift-F2.

The installation you end up with is not the complete distro as you would get installing it natively, but any extra packages can be installed in the usual way. If using Unity, the Software Centre is not installed, so open a terminal in Unity (Ctrl-Alt-T) and run:

```
sudo apt-get update
sudo apt-get install software-center
```

Now you can install any other packages you need from the GUI. You can also install extra target environments with the -u flag. For example, to add the LXDE environment to the Ubuntu chroot we created before, we would run:

```
sudo sh -e ~/Downloads/crouton -r saucy -u -t lxde
```

ADDING SOME PRIVACY

As you may have noticed, enabling Developer Mode gives you root access through sudo, without requiring a password. This is slightly less secure for Chrome OS, your login and files are still protected by your Google login, but it means that all the files in your chroot are readable, even with a passwordless guest login. If this concerns you, it is possible to encrypt the entire chroot by using the -e flag for Crouton. This prompts for a password and uses that to encrypt the entire chroot directory, meaning you can neither read nor run the chroot without the password. For example:

```
sudo sh -e ~/Downloads/crouton -e -r wheezy -t xfce
```

Unity is perfect for running everything in full-screen.

There are lots of distribution releases and targets to choose from; you could install them all at once but that would get pretty bloated, so how do you try them all out? The answer is that you can have as many chroots as you have space for.

If you plan to do this, you may find it easier to use Crouton's -n option to give each chroot a name, otherwise they are simply names after the release. Naming is important when installing multiple releases, because the name is needed when running the startup commands, otherwise Crouton just loads the first release in which it finds the target you gave. Adding -n, like this, lets you ensure the right release is loaded: `sudo startunity -n saucy`

Crouton also installs a couple of useful tools, particularly edit-chroot. This can be used to back up a chroot. `sudo edit-chroot -b saucy` creates a backup file in ~/Downloads, which you can restore with:

```
sudo edit-chroot -r ~/Downloads/backup-file.tar.gz
```

Copy this somewhere safe. Even if you do a full reset/recovery, you can still restore it by downloading Crouton again and running:

```
sudo sh -e ~/Downloads/crouton -f backup-file.tar.gz
```

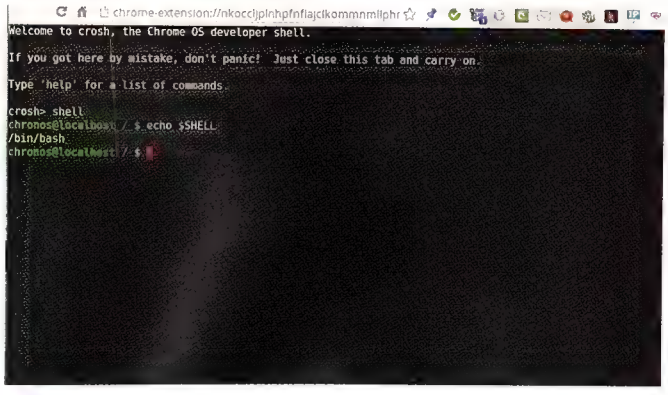
You can also use delete-chroot to delete a chroot, which you could have worked out for yourself, or you can simply delete the directory holding it from /usr/local/chroots to go back to a vanilla Chrome OS. Assuming, of course, that you'd want to do that. Follow the steps over the page...

Jargon buster

apt-get
The program used to install softw packages on Debian, Ubuntu ar other Linux distros.

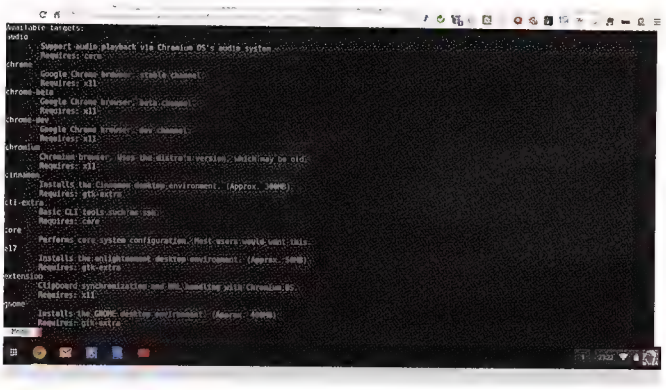
chroot
A directory into which a locked. It can't see any

Install a release


chrome-extension://nkoccljplnhpfnfiajclkommnmllphr
Welcome to crosh, the Chrome OS developer shell.
If you got here by mistake, don't panic! Just close this tab and carry on.
Type 'help' for a list of commands.
crosh> shell
chronos@localhost / $ echo $SHELL
/bin/bash
chronos@localhost / $

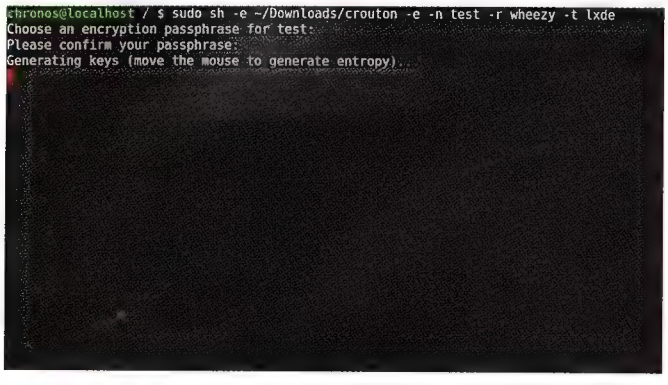
1 OPEN A SHELL

Open a terminal window by pressing Ctrl-Alt-T. This will be a basic Crosh shell in a browser tab, which has a limited set of commands — you can see them by typing list. One of the commands is shell, which gives you a full Bash shell, like other distros. It's true — Chrome OS has a proper Linux OS behind the scenes.



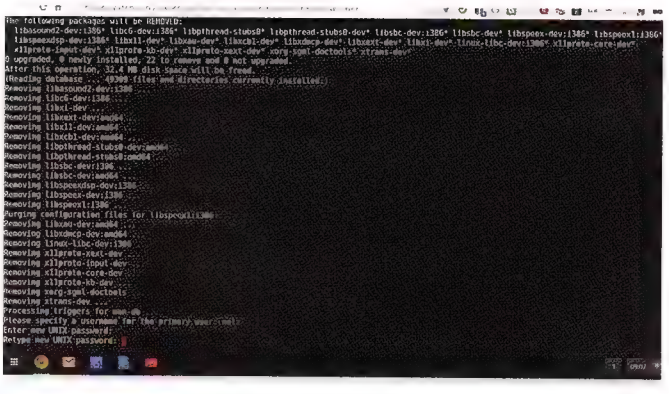
2 CHOOSE A RELEASE AND TARGET

Running Crouton with -t list will show you all the available targets. You'll probably want one of the standard desktop environments. Chromebooks are relatively low-powered, and a lightweight desktop such as LXDE is a good choice, while Unity is better suited to running everything full-screen.


chronos@localhost / $ sudo sh -e ~/Downloads/crouton -e -n test -r wheezy -t lxde
Choose an encryption passphrase for test:
Please confirm your passphrase:
Generating keys (move the mouse to generate entropy)...

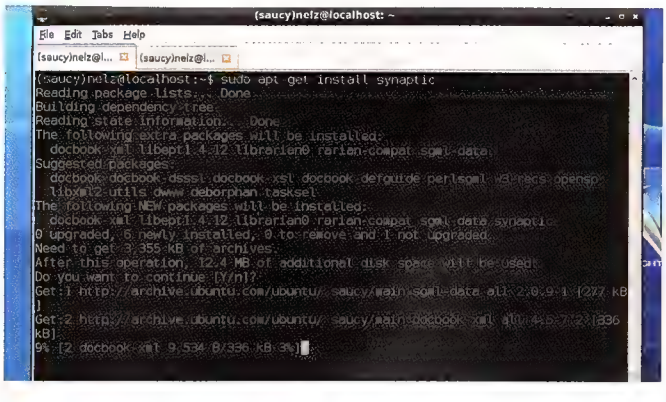
3 ENCRYPT YOUR FILES

Adding -e to Crouton's command line (this is not the same as the -e that follows sh) causes your chroot to be stored in an encrypted directory. Chose a decent passphrase — this is all that is protecting your files, but remember that most of your data will probably be saved in the cloud because Chromebooks have very little storage.



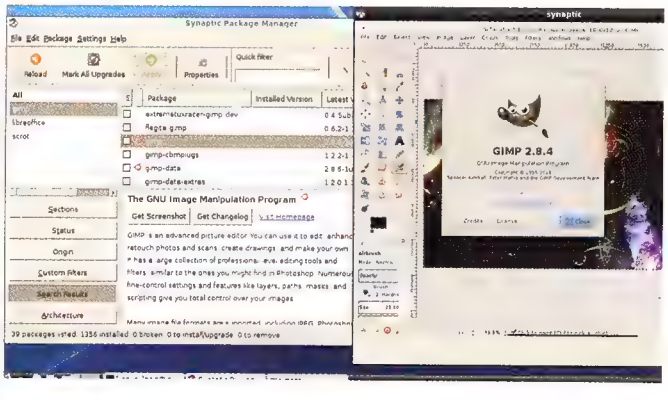
4 INSTALLING THE DISTRO

Because Crouton is only an installer, it needs to download the distro release files before installing, so allow time for this. Even with a fast connection, it can take more than 30 minutes to download and install everything if you have chosen large targets — the sizes are shown in the output from crouton -t list.


(saucy)nelz@localhost: ~
File Edit Tabs Help
(saucy)nelz@localhost:~$ sudo apt-get install synaptic
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
The following NEW packages will be installed:
0 upgraded, 6 newly installed, 0 to remove and 1 not upgraded.
Need to get 3,355 kB of archives.
After this operation, 12.4 MB of additional disk space will be used.
Do you want to continue [Y/n]?

5 ADD A PACKAGE MANAGER

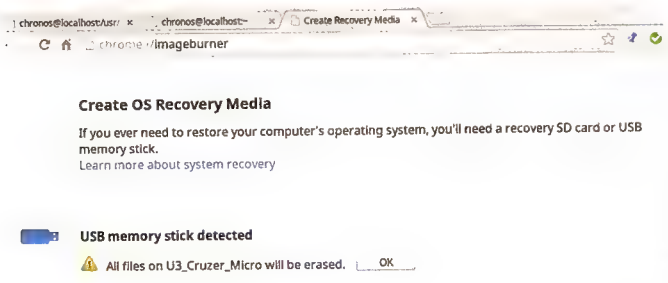
The default targets include only the command line package manager, apt-get. For most people, the first step is to open a terminal and use it to install a more friendly option, such as Software-center for Ubuntu or Synaptic for Ubuntu or Debian. Run `sudo apt-get update` to make sure you get the current version, then `sudo apt-get synaptic`.

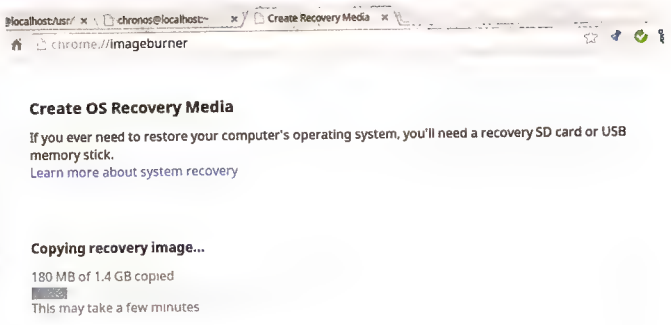


6 RUN SYNAPTIC

Once you have Synaptic installed, you have easy access to all the software in a distro's repository. Most of the targets are slimmed down, to save on downloads and give a faster installation, but you can install anything you want from here. Either use the Search button or just browse the categories to see what is available.

Recovery disks


chrono@localhost:/usr/
chrono@localhost:~
Create Recovery Media
chrome://imageburner
Create OS Recovery Media
If you ever need to restore your computer's operating system, you'll need a recovery SD card or USB memory stick.
Learn more about system recovery
USB memory stick detected
All files on U3_Cruzer_Micro will be erased.
OK


chrono@localhost:~
Create Recovery Media
chrome://imageburner
Create OS Recovery Media
If you ever need to restore your computer's operating system, you'll need a recovery SD card or USB memory stick.
Learn more about system recovery
Copying recovery image...
180 MB of 1.4 GB copied
This may take a few minutes

1 BACK UP TO USB

Plug in a USB stick or SD card of at least 2GB capacity, open Chrome and type **chrome://imageburner** into the location bar. Chrome OS downloads and installs the recovery image for your Chromebook. If you have more than one model of Chromebook, run this separately for each one; so that it gets the correct image for that device.

2 CREATE THE RECOVERY DISK

After downloading, the image is written to your USB stick. If you don't create a recovery disk, it's also possible to get this image from another computer and copy it manually, by following the instructions at **http://google.com/chromeos/recovery**, but you have to make sure you get the right image — they are specific to each model.

3 IN CASE OF EMERGENCY

If you corrupt Chrome OS and get the following scary 'Chrome OS is missing or damaged' message, plug in your recovery medium. You can also force a recovery, if you want to go ahead and restore it anyway, by pressing the hard reset button or key combination, which varies from model to model. Check your Chromebook's documentation for whatever applies.

Crouton: the pros and cons

Comparing a $400 Chromebook to a full laptop may seem unfair — it is more in the netbook price range, and aimed at a similar market — but we'll do that anyway.

Running Ubuntu or Debian on a Chromebook is just like running it on a proper laptop. The only differences are down to the use of a chroot. This means you have to boot into Chrome OS first and then open a shell to start the chrooted session, but Chromebooks are designed to be suspended rather than shut down, so this isn't necessarily often. Because it uses the hardware through Chrome OS, you need to do things such as set up your network connection in there, but as you can switch between the operating systems at will, this is not a problem. This isn't dual boot; it's running both systems at once — far more convenient.

The main limitation with this setup is the lack of storage space and dependence on a network connection and cloud services. While Chrome OS handles this transparently, you need to set up some sort of online syncing from your chrooted distro, using services, such as OwnCloud, Spideroak or Dropbox.

There are other ways of installing Linux on a Chromebook but Crouton does it in the least intrusive way, leaving your existing OS untouched (apart from needing to enable Developer Mode). Trying multiple options, and removing them when done, which is also a key benefit of this approach. Not least of its strengths is that Crouton is developed by the Chrome OS authors and isn't a third-party hack. Future updates to Chrome OS could break your chroots temporarily, but an update through Crouton will fix that. ■

X99 unleashed

Itching to build a ballsy rig based on Intel's new performance platform? Lindsay Handmer puts eight X99 boards to the test.

Intel's new X99 motherboards are built to support the chip giant's latest LGA 2011-v3 CPUs. They also all use DDR4 RAM and can handle multiple GPUs in both CrossFire and SLI. Many models feature SATA Express connections and while these offer higher speeds for next generation SSDs, the latter are not exactly common yet. Having the port for future proofing is always good, but M.2 can do the same job, only faster again. Using different names such as Turbo M.2 or Ultra M.2, these ports can all run up to 32Gbps. Depending on the setup, not all boards can run M.2 and SATA Express at the same time, or need to run some PCIe ports with fewer lanes if an M.2 SSD is installed. All the boards we tested use the Realtek ALC1150 audio codec, but each manufacturer implements their own installation. They all feature isolated designs, high quality components, 7.1 channels and optical audio outputs, so the final sound quality does not vary a lot. We tested using Rightmark Audio Analyzer, then scored the overall audio out of five.

MORE MEMORY?

Some boards list support for 128GB of RAM, but it's worth noting that there are not actually any DDR4 kits of this size available – and all X99 boards can handle this amount, in theory. For 64GB support, these boards have been vendor-tested with actual RAM kits to ensure compatibility.

BUILT FOR SPEED

In terms of unique hardware features, ASUS's X99 boards have launched with what the company's calling 'OC Socket'. Intel's LGA2011-v3 CPUs actually have more contacts than there are pins in the sockets, so ASUS set about figuring out what they do. ASUS has stated that the OC Socket gives better overclocking and voltage control and that its boards contain extra voltage regulation circuitry. OC Socket engages when running any settings aside from stock (including RAM frequencies, so pretty much all the time) and while the biggest benefits are with high end overclocking, we found it did improve performance slightly in normal use. Full performance comparisons are still ongoing, but the ASUS boards did top most of our benchmark tests. There is plenty of misinformation floating about, but ASUS has confirmed that OC Socket does not affect your Intel CPU warranty and won't damage your CPU. Gigabyte also has a high-end overclocking X99 motherboard that uses similar socket technology, but it's not included on the company's lower end products. OC Socket seems to have potential, but unless you're a hardcore overclocker, for now we wouldn't say it's a make or break feature for your next motherboard upgrade.

HOW WE TESTED

All X99 boards were benchmarked with an eight-core Intel i7-5960X CPU, which has a stock clock speed of 3GHz and can boost up to 3.5GHz. We ran our boards with 16GB (4 x 4GB) of 3,000MHz Kingston HyperX DDR4. We used a 256GB Samsung 850 Pro SSD as the main OS drive. Graphics grunt was provided by an AMD Radeon R9 295x2, and the CPU was cooled with a Cooler Master Nepton 140XL closed loop water block. Many motherboards now come with auto-overclocking functionality, which can give you a very easy boost in performance. On our CPU, we found that 4GHz was around the sweet spot for simple DIY overclocking before you had to start manually tweaking your voltages and settings.

BENCHMARKS

	ASROCK X99 EXTREME 6	ASROCK X99 WS	ASUS X99-A	ASUS X99 DELUXE	GIGABYTE X99-SOC FORCE	GIGABYTE X99 UD3	MSI X99S XPOWER AC	MSI X99 GAMING 7
GENERAL SYSTEM PERFORMANCE								
CINEBENCH R15								
- SINGLE/MULTICORE PERFORMANCE (SCORE)	133/1289	139/1324	139/1317	141/1399	138/1311	137/1301	140/1321	137/1299
- OPENGL (FPS)	148.36	154.06	151.87	156.75	148.07	149.85	149.03	146.15
- OVERCLOCKED SINGLE/MULTICORE PERFORMANCE (SCORE)	146/1498	149/1524	148/1536	158/1569	153/1551	150/1550	150/1565	148/1554
PCMARK 8 HOME (OVERALL SCORE)	4189	4303	4356	4413	4325	4287	4356	4299
X264 HD BENCHMARK 5.01 - PASS 1/ PASS 2 (FPS)	96.32 / 27.14	96.17/27.56	96.03 / 27.56	101.58 / 29.22	96.20 / 27.66	97.12 / 26.47	97.37 / 27.14	96.56 / 26.78
AUDIO TEST (SCORE OUT OF 5)	3	3	3.5	4	3.5	4	4	3.5
GAMING PERFORMANCE								
COMPANY OF HEROES 2 (1080P)								
- LOW DETAILS (MIN/MAX/AVG FPS)	39.92 / 90.51 / 66.37	47.99 / 98.80 / 69.41	50.85 / 106.68 / 71.35	49.35 / 98.91 / 69.14	42.83 / 97.22 / 65.08	41.23 / 97.88 / 66.45	51.74 / 110.89 / 73.95	42.79 / 88.98 / 71.61
- HIGH DETAILS (MIN/MAX/AVG FPS)	26.22 / 63.19 / 45.02	27.86 / 62.81 / 45.83	26.84 / 64.74 / 45.12	32.51 / 84.75 / 54.26	25.90 / 63.81 / 44.63	26.36 / 64.47 / 48.34	25.74 / 64.42 / 46.08	24.17 / 61.85 / 45.33
STORAGE PERFORMANCE (AS SSD BENCHMARK)								
- SEQUENTIAL READ/WRIT SPEED (MB/S)	509.87 / 486.98	512.42 / 371.15	511.17 / 482.14	510.54 / 497.98	512.29 / 488.45	511.99 / 485.47	512.94 / 489.33	511.28 / 491.73
- 4K RANDOM READ/WRITE SPEED (MB/S)	26.59 / 88.94	29.22 / 88.52	30.11 / 91.60	29.21 / 87.17	26.54 / 77.57	27.89 / 76.47	29.65 / 87.16	27.51 / 74.30

MOTHERBOARD

$359 | WWW.ASROCK.COM
128GB 3000MHz+ (OC) RAM, 3 x PCIe x16, Ultra M.2 , 10 x SATA 6Gbps, eSATA, 10 x USB 3.0, 7 x USB 2.0, Dual Gigabit Ethernet.

ASRock X99 Extreme 6

A very affordable X99 upgrade.

The Extreme 6 supports up to 128GB of quad channel DDR4, though its overclocked frequency limit is 3,000MHz. The ASRock has three PCIe 3.0 x16, two PCIe 2.0 x1 and one mini-PCIe port that supports three-way SLI or CrossFire. Like the X99 WS, the Extreme 6 has an Ultra M.2 connection for SSD speeds up to 32Gbps.

The ASRock uses the same very capable BIOS as the more expensive board that makes it easy to tweak your setting. You also get hardware power buttons and a post debug display. The Extreme6 had no issues running our CPU at 4GHz, though we did have to manually set our voltages rather than leave them on auto. Performance is solid, but it is very slightly lower than the more expensive boards and the audio gave rather inconsistent results

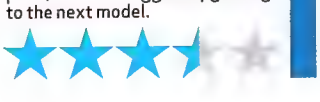
The board has dual Gigabit LAN, but only one is powered by Intel, whereas the other uses an Atheros chipset. The Extreme6 doesn't feature SATA Express, but does have 10 SATA 6Gbps ports as well as eSATA, plus an impressive array of 10 USB 3.0 and seven USB 2.0 ports front and rear.

The Extreme6 has a Thunderbolt AIC connector, though no actual Thunderbolt card. While you can't use the functionality out of the box, it is ready for an upgrade if need be.

If you want to take the X99 savings further, the ASRock X99 Extreme4 is just $290, while the Extreme3 sacrifices a few more features to hit just $249.

Verdict

A solid board if you get it for a good price, but we'd suggest upgrading to the next model.



MOTHERBOARD

$385 | WWW.ASROCK.COM
128GB 3200MHz+ (OC) RAM, 5 x PCIe x16, Ultra M.2 , 10 x SATA 6Gbps, eSATA, 6 x USB 3.0, 8 x USB 2.0, Dual Gigabit Ethernet.

ASRock X99 WS

Is it worth skipping a few extra features for a lower price?

Setting up the ASRock board for benchmarking was quick and simple thanks to the well laid out design. The motherboard has plenty of space around the CPU socket (though tall RAM could impact your cooler choices) and good access to the connectors. The WS supports quad channel DDR4, with up to 128GB running at an overclocked 3200MHz. You get 5 PCIe 3.0 x16 slots, plus another PCIE 2.0 x16 connection that supports four-way SLI and CrossFire.

The ASRock UEFI BIOS is quite functional without being over the top and makes it easy to manually tweak your system. Overclocking on the X99 WS is straightforward using the OC Tweaker and we had no issues bumping our CPU up to 4GHz. The board has a hardware power and reset button as well as a post debug display. Performance was generally on par with the competition, though the audio implementation was not quite as good.

The X99 WS has M.2 socket, which gives you the option to upgrade your PC with an ultrafast 32Gbps SSD. The board does not have any SATA Express ports, but it does have 10 SATA 6Gbps connections as well as eSATA. Round the back you get dual Intel Gigabit LAN, but no wireless connection. Six USB 3.0 and eight USB 2.0 ports are spread front and rear, as well as a legacy PS/2 port. The X99 WS also has a fairly comprehensive suite of software available (and even an ASRock APP shop) from an Ethernet manager to a handy tuning helper.

Verdict

We can't fault the performance of this ASRock board, but it is a little less polished than the competition.

$369 | WWW.ASUS.COM/AU
ASUS OC Socket, 64GB 3200MHz (OC) RAM, 3x PCIe x16, SATA Express, M.2, 10x USB 3.0, 8x USB 2.0, Gigabit Ethernet.

ASUS X99-A

Powerful, but still affordable too.

Doing away with some of the extras of the Deluxe, the more affordable X99-A still supports all the latest LGA2011-v3 CPUs as well as eight DIMMS (and 64GB) of RAM at up to 3200MHz. You can also run SLI or CrossFire for high end gaming performance across three PCIe x16 slots.

Like its bigger brother, the X99-A gets the ASUS OC socket to give a better overclocking experience. Auto overclocking saw a slight boost, but the board was easy to run at 4GHz with zero fuss. You also get the excellent ASUS UEFI BIOS which gives easy access to all the setting you need. If you want to upgrade your data speeds, the X99-A comes with an M.2 socket, as well as SATA Express and eight SATA III ports. You get 10 USB 3.0 ports front and back, plus eight USB 2.0 connections.

Round back it has a single Gigabit LAN port as well as a legacy PS/2 connector. Performance was not significantly behind the more expensive ASUS Deluxe offering and the X99-A actually features one of the better audio implementations we tested. You also get the ASUS '5-Way' optimisation that lets you easily configure your cooling, performance and efficiency.

So what is the X99-A missing for the $160 or so discount? Not a lot really. There's no Wi-Fi or Bluetooth built-in, only one Gigabit LAN port, somewhat reduced PCIe options and a slightly smaller array of SATA and USB connections. Power users may delight in the higher end board's expanded features, but for the rest of us this X99-A is great value.

Verdict

Excellent X99 performance, though sans a few of the extra bells and whistles.

★★★★½

$529 | WWW.ASUS.COM/AU
ASUS OC Socket, 64GB 3200MHz (OC) RAM, SATA Express, M.2, 5 x PCIe x16, 14 x USB 3.0, 6 x USB 2.0, 3T3R 802.11ac Wi-Fi, Dual Gigabit Ethernet.

ASUS X99 Deluxe

Packs in oodles of extras. At a price.

The X99 Deluxe uses the new ASUS OC Socket and supports the latest Intel LGA2011-v3 CPUs, as well as 64GB of DDR4 RAM with frequencies at up to 3200MHz. The board has an excellent layout, with a clear socket area and easily accessible connectors – though the RAM is a touch closer to the CPU than we would like.

The board can support quad SLI and CrossFire and has very handy LEDs (controlled by a switch) to show which PCIe slots you should use depending on your GPU configuration. The Deluxe has 10 SATA 6Gbps ports, as well as SATA Express (using two SATA II ports) and a vertical M.2 slot capable of up to 32Gbps.

The UEFI BIOS is first rate and gives access to a huge range of settings and controls. The auto tune feature bumped our CPU up to 3.7GHz, but we had no issues pushing a little further to 4GHz. The X99 has a cool feature that lets you update the BIOS from a USB key using a button on the back of the board – you don't even need a CPU or RAM installed.

The X99 Deluxe is very well equipped, with built in 3T3R 802.11ac Wi-Fi for speeds up to 1300Mbps, as well as dual Intel Gigabit Ethernet ports and integrated Bluetooth. You get a total of 14 USB 3.0 ports (a whopping 10 of which are on the rear panel), plus another six USB 2.0s. During benchmarking, the X99 Deluxe topped most of our system and gaming test and also had excellent audio quality on the whole.

Verdict

A slight price premium gets you a comprehensive list of features and top notch performance.

★★★★½

MOTHERBOARD

$499 | WWW.GIGABYTE.COM.AU
64GB 3000MHz+ (OC) RAM, 4 x PCIe x16 slots, SATA Express, Dual M.2, 10 x USB 3.0, 8 x USB 2.0, Intel Gigabit Ethernet.

Gigabyte X99-SOC Force

Push your hardware to the extreme.

The Gigabyte board is geared to overclocking, with hardware overclock controls, debug display, PCIe switches, voltage measurement pads and a direct boot to BIOS button. Importantly the buttons are very well placed and can't be blocked by your GPUs. The board also features OC Ignition, which provides power while off – making it easy to pre-test your water cooling setup or demo your case mods without needing to turn on your PC.

You get both SATA Express and Turbo M.2 (though can't use both at once), as well as 10 SATA III connections. You can run up to four GPUs in CrossFire or SLI and even get a brace to keep your cards in place if running the motherboard out of a case.

Like its little brother, the SOC Force gets programmable LED lighting and the ability to automatically flash the BIOS from a USB stick. The Realtek audio implementation is quite good, though was actually very slightly behind the cheaper Gigabyte board. The Force has a single Intel Gigabit LAN port, but no Wi-Fi or Bluetooth. This is both good and bad – the board is cheaper than some of the competition with Wi-Fi, giving you the choice to add it later, but it is nice having it built in. You also get a total of 10 USB 3.0 ports, plus another eight USB 2.0,

You can also get an LN2 version of the motherboard, which is designed for extreme overclockers. Like the ASUS board, this version has extra pins to give better overclocking.

Verdict

Gigabyte durability with excellent overclocking credentials.

★★★★½

MOTHERBOARD

$329 | WWW.GIGABYTE.COM.AU
32GB 3000MHz+ (OC) RAM, 4 x PCIe x16 slots, SATA Express, Dual M.2, 8 x USB 3.0, 8 x USB 2.0, Intel Gigabit Ethernet.

Gigabyte X99-UD3

Rock solid and reasonably priced.

Built for users who want durability and stability, the UD3 makes a few minor sacrifices to keep the price down. The Gigabyte board uses four slots for up to 32GB of DDR4 RAM compared to some of the competitions 64GB, but for typical use this is plenty. The UD3 has both SATA Express and M.2 for next gen SSDs. The M.2 connection is a dual stacked design, meaning you can also install other add-ins such as Wi-Fi.

While not specifically aimed at overclockers (and without features such as hardware power buttons), the board can still handle its own and will happily eke extra performance from your CPU. Overall performance was excellent and while the UD3 was not the fastest board, it gave the best performance considering the price.

The Gigabyte UD3 has a super handy feature that will automatically update the BIOS from a flash drive, even if the computer won't boot, is turned off or doesn't have the CPU or RAM installed. The UEFI BIOS is well laid out but we had a slightly buggy experience until we updated to the latest version. Round the back you get Intel Gigabit LAN, as well as a bevy of USB ports and even two PS/2 connections.

The UD3 also comes will funky LED lighting on the board and back plate that can be programmed to pulse or flash in time to your music. The UD3 uses the ever popular Realtek ALC1150 audio codec, with a high quality implementation.

Verdict

A no-nonsense, great bang-for-buck X99 upgrade.

★★★★½

MOTHERBOARD

$350 | AU.MSI.COM
128GB 3333MHz+ (OC) RAM, 4 x PCIe x16 slots, SATA Express, Turbo M.2, 10 x SATA III, 12 x USB 3.0, 6 x USB 2.0, Killer Gigabit Ethernet.

MSI X99S Gaming 7

MSI's more-affordable option for building a performance gaming PC.

As expected from motherboards these days, the board layout is excellent – our only niggle is that the power and reset buttons could get overshadowed by a GPU in some configurations.

If you have a compatible drive, the MSI board has both SATA Express and Turbo M.2, for speeds of up to 10Gbps and 32Gbps respectively. The MSI can run three-way SLI and Crossfire, but shares some of the PCIe pathways with the M.2 slot, so configuration can be a little tricky. The Gaming 7 can also handle up to 128GB of DDR4 at speeds up to 3333MHz (OC).

The MSI board comes with Click BIOS 4, which gives an intuitive interface that has a good depth of manual (and automatic) control available. The Gaming 7 has OC Genie 4, which automatically boosted our system up to 3.7GHz, though 4GHz with no manual voltage control is a cinch. Performance was consistent across the board aside from one low sequential read/write result and the audio was one of the better we tested.

The MSI board is reasonably generous with USB 3.0 ports, with a total of four front and eight on the rear, as well as six USB 2.0 connections. You also get great isolated audio from the Realtek ALC1150, with 7.1 channels and optical output. Gaming 7 uses Killer E2200 Ethernet, which actively manages your connection to ensure gaming bandwidth. You also get what MSI calls a gaming device port, which is optimised to ensure the best connection for your gaming mouse.

Verdict

A solid all-rounder with better than average audio.

★★★½☆

MOTHERBOARD

$530 | AU.MSI.COM
E-ATX Form Factor, 128GB 3333MHz+ (OC) RAM, 5 x PCIe x16 slots, SATA Express, Turbo M.2, 14 x USB 3.0, 7 x USB 2.0, Dual Gigabit Ethernet, 802.11ac Wi-Fi.

MSI X99S XPower AC

Is this board's strong overclocker focus enough to justify the price?

Right off the bat, it's worth stating that this XPower board uses an E-ATX form factor, so won't fit in some smaller cases. You get a lot onboard though, with SATA Express, as well as Turbo M.2 and 10 SATA II ports. The XPower has a strong focus on processor overclocking, with the MSI engineers using feedback from extreme overclockers to optimise the design.

It includes extras such as extra on board OC buttons to adjust the base-clock in real time, a slow mode switch to help boot into Windows stably, easily accessible voltage check points and a special die guard for your de-lidded CPU. The MSI board can run four-way SLI and CrossFire, but if you want to disable some cards during overclocking or troubleshooting, the board has physical switches to turn the PCIe slots off. The XPower comes 'overclock certified' – the motherboard is stress tested for 24 hours with a highly overclocked CPU running Prime95. Performance was good across the board at stock frequencies, but the MSI didn't shine till we bumped it up to 4GHz. While still not the fastest OC board, it showed a big improvement when pushed.

The AC means the XPower comes with 802.11ac Wi-Fi, though the dual antenna means it is limited to a (still excellent) 867Mbps. You also get dual Intel Gigabit Ethernet ports, Bluetooth and a massive 14 USB 3.0 ports (plus seven USB 2.0s). The MSI board comes with a range of overclocking software, including lite versions to keep system resources free for the best benchmarking results.

Verdict

A great board if you need the overclocking extras, otherwise a little overkill for everyday use.

★★★½☆

DrayTek
Aust & NZ
www.draytek.com.au

NBN Ready Routers

Fast . Reliable . Secure

Ideal for home to small to medium size business networking solutions.

VDSL2 / ADSL2+ Professional Business Firewall Routers

Vigor2760 Series - VDSL2 / ADSL2+ Firewall Router with 2 x VPN tunnels

TAIWAN EXCELLENCE 2012

NBN READY

UFB READY

- Built-in VDSL2 / ADSL2+ modem
- Selectable Gigabit WAN / LAN (for NBN Connection Box or other xDSL / Cable modems)
- 4 x Gigabit LAN ports with 30,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 2 x VPN tunnels with hardware accelerator
- 2 x USB ports for 3G / 4G Backup, FTP server and network printers
- IEEE 802.11n Wireless LAN for Vigor2760n and Vigor2760Vn
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2760Vn
- Support TR-069 for VigorACS SI Central Management

Vigor2860 Series - Quad-WAN Firewall Router with 32 x VPN tunnels

TAIWAN EXCELLENCE 2013

NBN READY

UFB READY

- Quad-WAN Firewall Router with 1 x built-in VDSL2 / ADSL2+ modem, 1 x Gigabit WAN port & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 6 x Gigabit LAN ports with 50,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 32x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 16 x SSL VPNs
- 2 x USB ports for 3G / 4G modems, FTP server, network printers & temperature sensor
- IEEE 802.11n Wireless LAN with Central AP Management for Vigor2860n / n-Plus / Vn-Plus
- Concurrent Dual-Band Wi-Fi for Vigor2860n-Plus and Vigor2860Vn-Plus
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2860Vn-Plus
- Support Smart Monitor Traffic Analyzer (up to 30-nodes)
- Support TR-069 for VigorACS SI Central Management

Broadband Professional Business Firewall Routers

Vigor3900

Multi-WAN Enterprise Firewall Router with 500 VPN Tunnels

NBN READY

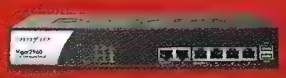
TAIWAN EXCELLENCE 2012

- 5 x Gigabit WAN ports (4 x Ethernet & 1 x SFP) & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 3 x Gigabit LAN ports (2 x Ethernet & 1 x SFP) with 120,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- High-Availability (with CARP) ensuring 24/7 system uptime
- 500 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 20 x SSL VPNs
- 2 x USB ports for 3G / 4G modems & temperature sensor
- Support Smart Monitor Traffic Analyzer (up to 500-nodes)
- Support TR-069 for VigorACS SI Central Management

Vigor2960

Quad-WAN Professional Firewall Router with 200 VPN tunnels

TAIWAN EXCELLENCE 2013



NBN READY

- 2 x Gigabit WAN ports & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 4 x Gigabit LAN ports with 80,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 200 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 20 x SSL VPNs
- 2 x USB ports for 3G / 4G modems & temperature sensor
- Support Smart Monitor Traffic Analyzer (up to 200-nodes)
- Support TR-069 for VigorACS SI Central Management

Vigor2925 Series

Quad-WAN Firewall Router with IPv6 & 50 VPN tunnels

TAIWAN EXCELLENCE 2013

NBN READY

- 2 x Gigabit WAN ports & 2 x USB ports for 3G / 4G Mobile with Load Balance and Fail-Over
- 5 x Gigabit LAN ports with 50,000 NAT sessions, IPv6, SIP Firewall, Web Content Filter and QoS
- 50 x VPN tunnels with VPN load balance and redundancy, Central VPN Management & 25 x SSL VPNs
- 2 x USB ports for 3G / 4G modems, FTP server, network printers & temperature sensor
- IEEE 802.11n Wireless LAN with Central AP Management for Vigor2925n / n-Plus / Vn-Plus
- Concurrent Dual-Band Wi-Fi for Vigor2925n-Plus and Vigor2925Vn-Plus
- SIP VoIP (2 x FXS and 1 x Line port) for Vigor2925Vn-Plus
- Support Smart Monitor Traffic Analyzer (up to 50-nodes)
- Support TR-069 for VigorACS SI Central Management

i-LAN TECHNOLOGY

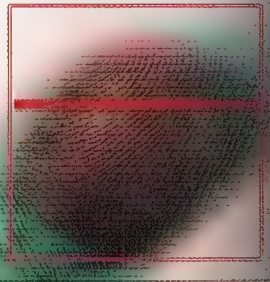
i-LAN Technology Pty Ltd trading as DrayTek Aust & NZ

www.i-lan.com.au (02) 9838 8899 sales@i-lan.com.au

© Copyright 2014 i-LAN Technology Pty Ltd. All rights reserved.

THE DANGER OF SECURITY THEATRE

Security theatre is a frightening business that's costing us our personal freedoms. See how it affects you every day.



There's a new threat creeping into our online lives, reducing how secure we are while we browse the web both at home and at work, yet strangely it's making us feel more secure. This threat is a concept called security theatre, a term coined by security expert and author Bruce Schneier back in 2003. He defined it as, "Security measures that make people feel more secure without doing anything to actually improve their security." He was referring mostly to the knee-jerk reaction seen in the field of airport security, and the new measures that were implemented after the 9/11 attacks, most of which would have done nothing to stop the terrorist attacks even if they were in place beforehand. Even those measures that would have directly challenged how the terrorists operated would merely have forced minor changes to their plans.

However, security theatre isn't limited to transport security. It's evident in the policy making of a lot of corporate security procedures, and is even invading our homes. We're already spending time and money thinking we're protecting ourselves, whereas in fact we're actually doing nothing to increase how safe we are and may even be putting ourselves more at risk.

It's an easy trap to fall into because this is how we're psychologically wired, as Schneier explains in his article entitled 'In Praise of Security Theatre'. "Security is both a reality and a feeling," he writes. "The reality of security is mathematical, based on the probability of different risks and the effectiveness of different countermeasures… Security is also a feeling, based on individual psychological reactions to both the risks and the counter measures. And the two things are different – you can be secure even though you don't feel secure and you can feel secure even though you're not really secure."

This explains the ridiculous situation of having to divide a 200ml bottle of baby milk into two 100ml bottles before being allowed to board a plane. Clearly you still have the same amount of liquid, so if it was dangerous this hasn't limited the risk in the slightest. It seems, though, that people really are reassured when they see officials doing something in response to a security threat, even if what they're doing, when you think about it logically, only covers very specific risks, which could easily be sidestepped by anyone truly committed to doing you harm.

We're not just talking about spending millions on airport full-body scanners, whose software can't identify low-density substances such as harmful chemical powders or liquids, and would be unlikely to detect plastic weapons. Or the forced implementation of face-scanning software, which is, on average, only 30% accurate. Or even pre-screening of boarding information to target riskier travellers, which has been proved not to work, because the criteria by which they choose who is safe and who isn't is widely available and so easily sidestepped – just choose someone who is as far away from that profile as possible to do your dirty work. Now your terrorist can just walk in and is far more likely to not be picked to be searched. In this case, the security policy has actually provided a description of the type of person you need to use to avoid being detected as a potential terrorist.

However, it's not just airports that are havens for security theatre. You encounter it in much more common areas, from your place of work to your home, and there are many people out there trying to highlight this. In fact, after talking to a cross-section of them, we're willing to bet that you have probably performed one example of computer security theatre, or actually felt guilty about not doing it, in the past month, if not more recently.

SECURITY THEATRE AND YOU

Don't believe us? The world of IT security is rife with examples of security theatre of one type or another, with differing levels of risk associated with doing them. Everything from automated password changes, backing up work to external drives, using antivirus software, to acting on web site security certificates is costing you time and, therefore, any company you work for, money – and yet is likely to be ineffectual at making you any safer online at all.

Time is an important economic factor and even your own personal free time is slowly being eroded by the patchwork of policies people adopt to make themselves feel safer while using computers. Nowadays, there are so many things a conscientious home PC user is expected to do that we're in danger of becoming overwhelmed, and a lot of it is demonstrably not worth it. We're expected to choose the best antivirus and firewall software for ourselves, ensure it's regularly updated by downloading the latest security updates, watch our computer slow to a crawl as regular background checks and scans are carried out, update our browsers to ensure the software we use to browse the web doesn't have security flaws from using outdated connection methods, check out websites' security certificates (see 'Security theatre certificates', opposite) – often choosing to ignore them when you're pretty certain the warnings you're getting, as seriously worded as they are, are false positives – and back up all our important files to a spare hard drive on a regular basis.

It isn't all a waste of time, of course, but a lot of it is. As Schneier explains: "Like real security, security theatre has a cost. It can cost money, time, concentration, freedoms and so on. It can come at the cost of reducing the things we can do. Most of the time security theatre is a bad trade-off, because the costs far outweigh the benefits."

THE ECONOMICS

It's not just Schneier who recognises this. Microsoft has even put together a research paper on the subject. Written in 2010 by Cormac Herley, and with a title giving a nod to the late, great Douglas Adams, an author who was known for ridiculing the bureaucracy so often found in corporate life, Herley's paper, 'So long, and no thanks for the externalities: The rational rejection of security advice by users', exposes the dangers of strict adherence to IT security guidelines when it's clear they aren't much use in the real world, and can even be counterproductive. Although the paper is focusing on the costs of implementing useless security procedures, it's highlighting security theatre just the same. As the paper's abstract states, "It is often suggested that users are hopelessly lazy and unmotivated on security questions. They choose weak passwords, ignore security warnings and are oblivious to certificates errors. We argue that users' rejection of the security advice they receive is entirely rational from an economic perspective."

In other words, the indirect costs of, for example, getting your staff to update their password every couple of months, and then dealing with the fallout of people forgetting their passwords, is not the most economic use of time, especially, as we shall see, as this doesn't seem to offer any more security.

AUTOMATED PASSWORD CHANGES

Although on the face of it regular password changes seem an excellent idea, it has actually led to a lot of people's work passwords being a lot less secure than if they had just left them as the original in the first place. We spoke to Graham Cluley, computer security consultant for internet security firm Sophos, and he agrees. "Many firms regularly ask users to change their passwords," he says. "The idea appears to be that this makes the password more of a moving target. If your firm tells you that you ought to change your password every month or every three months, it can actually be a negative thing. Making people choose new passwords all the time may make them choose weaker ones, or ones that are more predictable. For instance, users might adopt poor habits and choose passwords such as Password1, Password2, as they change it each month."

David Emm, senior security researcher at Kaspersky Lab, believes a lot of security theatre may originate from companies not having any true figures on just what cybercrime is occurring.

He adds, "Of course, you should change passwords if you believe a password has been compromised but you shouldn't give a blanket rule for the entire organisation telling them to all change their passwords every eight weeks, unless there's a good reason."

If you have a system like this at your work, it's likely that something generic has replaced your original personal and unlikely-to-be-guessed password long ago, just so you can remember it and because these systems often won't let you revert to old passwords. What's slightly more strange is, if you analyse it, the logic behind regularly changing your password is flawed in the first place.

Firstly, what is the reason to change your password? In case it has been already been compromised? This would assume that the criminals who have found out your password have, for some reason, been sitting on this information before using it to their advantage in any way. That's a bit like someone stealing your house keys out of your bag, then the thief waiting until you've had a chance to change the locks before attempting a burglary. The only way this practice could help is if you managed to change your password the second it was compromised, a reasonably unlikely occurrence if you aren't aware it has happened.

The second problem with following this advice blindly is that the easiest way to get malicious software on to a person's PC, and therefore gain access to a corporate network or their personal bank details, is not to try to guess passwords, it's to go for the weakest link in any chain – the users themselves. As Schneier says, "Only amateurs attack machines; professionals target people." And this quote seems to be backed up by Herley's Microsoft research paper, when he states, "The best way to get software on to any machine is to get the user to install it, and human error is behind many of the most serious exploits." So a hacker doesn't even need your password – they enter your system via the backdoor you create by installing their software.

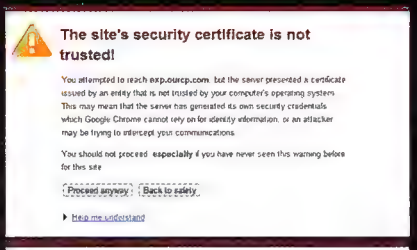
How about other password rules then, like those used by banking web sites insisting on length, that your password isn't a word in the dictionary, that it

Security theatre certificates

With a 2010 Microsoft research paper stating that web site security certificate warnings gave 100% false positives, could they be the ultimate form of 'security theatre'?

Another area of security theatre where a great deal of time and money has been spent by companies worldwide is in creating or buying security certificates for their web sites, which are needed for secure browsing. These are used when using SSL (secure socket layer), a security protocol used to transmit confidential information such as passwords or personal details securely (SSL is in use when http: is replaced by https: in the browser bar). These certificates tell web browsers information such as the web site's address, which can be corroborated by trusted third-party organisations to check you're connecting to the web site you think you are.

However, in some cases you can accidentally make the certificates appear wrong and get a warning saying, "There is a problem with this web site's security certificate," even when there is not. For example, if your computer's system date is accidentally set in the future, past the time when these certificates will have expired, every visit to an https domain will result in a false positive. In Cormac Herley's 2010 Microsoft research paper, he discovered that pretty much 100% of security certificate warnings were false positives. This means, every time someone chose to ignore the browser warning, they still got to the site they wanted; and if they didn't ignore it, they were effectively prohibited from going where they wanted to go for no good reason. This means that instead of protecting people from dodgy sites, it was much more likely to just be costing PC users time, with the concomitant likelihood that if they should see a real warning, it would probably be ignored.


The site's security certificate is not trusted!
You attempted to reach exp.ourcp.com, but the server presented a certificate issued by an entity that is not trusted by your computer's operating system. This may mean that the server has generated its own security credentials which Google Chrome cannot rely on for identity information, or an attacker may be trying to intercept your communications.
You should not proceed, especially if you have never seen this warning before for this site.
Proceed anyway
Back to safety
Help me understand

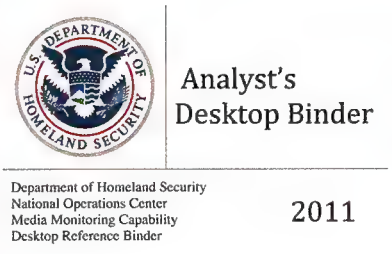
Site security certificate warnings are more often false positives than genuine threats, so could we do without this form of security theatre?

needs to contain special characters, and that you shouldn't share it between sites? Surely these are sensible? Not when you consider that, as mentioned, cracking a password isn't how most criminals attempt to get into your system. After simple human error, the two most common ways that people gain access to restricted areas and accounts is phishing (getting you to reveal your password by making it look like you're logging into your account when you aren't – for example, those fake bank emails with a 'login here' button that takes you to a site that looks like, but isn't, your bank's) and keylogging (a program installed on your, or a shared, computer that records every keystroke you make, which keeps logs that can be looked through to find likely passwords). Here again, it doesn't matter how unbreakable your password is if the criminals know what it is. Which slightly makes a mockery of all that time you spent thinking up and memorising those unique passwords.

REAL THREAT — BAD RESPONSES

That's not to say that the threat isn't real. As Herley explains, "The range of attacks directed against internet users is vast and growing. Their computers are constantly targeted by viruses, worms, port scanning software, spyware, adware, malware, keyloggers, rootkits, and zombie and botnet applications. One study reports that an unpatched Windows PC will be compromised within 12 minutes of connecting to the internet." Herley acknowledges that security procedures are needed, but he questions whether security experts are right to assume they know the right thing to do: "In one view of the world, users are ignorant of the risks they face and must be educated to save them from themselves. 'If only they understood the dangers,' the thinking goes, 'they would behave differently.' However, this presupposes that we (security experts) understand the risks better than users. Do we? Do we have evidence to demonstrate that users who follow advice fare better than those who ignore it and that the difference is worth the extra effort?" In Herley's view, the short answer to these questions is no. It's easy to see why. With a complete lack of information available on how criminals are getting the details of the user accounts they hack, are we right to force users to follow a prescribed set of rules that don't bear close examination?

Herley's paper also comes up with some, admittedly rather basic, calculations on just what the cost of these types of procedures can have in terms of user effort if you look at the whole of a country. For example, he estimates that with 180 million online adults in the US, all of whom he's assumed to have a salary of twice the minimum wage ($7.25), then the cost of one minute's work choosing a new password over the year equals about $15.9 billion a year. That's a lot to spend on a pretty much pointless exercise. We asked Bruce Schneier why corporations insist on carrying out these security theatre-type procedures when they must be aware of the small effect they have? His answer is simple: "What makes you think they're aware?" In response to the same question, Graham Cluley adds, "Sometimes security issues are complex, and IT teams might feel that it's easier to go with the crowd and please staff and senior managers by being seen to do a proper job, rather than concentrate on the things that really matter."



The US Department of Homeland Security's guidelines on what keywords it's monitoring on news channels and social networks are outlined in this document.

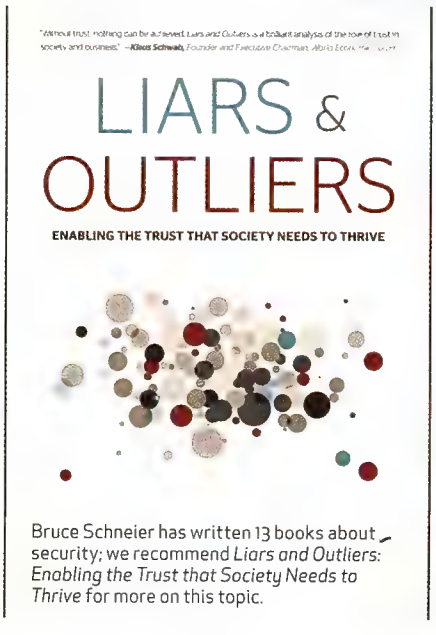
David Emm, senior security researcher at Kaspersky Lab, believes this is compounded by the fact it's very difficult for companies to know how and where to invest in security, and it's this uncertainty that can lead to security policy decisions that may turn out to be a waste of time and money. "Sometimes there's a risk that security theatre may creep into the way potential online dangers are framed," he says. "For example, from time to time, there's a heavy focus placed on the costs associated with cybercrime. But the numbers quoted vary dramatically. It's actually impossible to put an accurate figure on the costs. It's a bit like trying to calculate the earnings of drug dealers – the criminal nature of their activities makes it guesswork at best. The reason why numbers are perceived to be important is to provide justification for security investment – it seems like a tangible way of showing what the benefit of the investment will be. I believe it makes more sense for companies to look at the real risks

they've faced – let's say during the previous quarter or year – and show how security measures have, or will, mitigate the risks."

ANTIVIRUS SECURITY THEATRE

As suggested, it's not just in the workplace that time-wasting security procedures can be found. Look around on your desktop and you don't have to go far to see some more examples of security software indulging in a little theatre. For example, a lot of the older and more established paid-for antivirus software systems regularly waste your time, by telling you when it's time to get new security updates, telling you when they are doing a scan, and showing you the possible threat positives they've found (which most people don't know what to do with even if they're told – and shouldn't need to, surely it's the antivirus software's job to say whether something's a threat or not?). Each of these processes can be described as security theatre. Why do you need to know? Surely all this should just happen in the background without it wasting your time?

However, looked at another way, it's doing something. It's reassuring you that you're protected, that you're safe. Those official-looking 'Your system is clean from all infection' messages make you feel secure, even if what the software is telling you isn't actually true. What average computer user is going to question the authority of a security program? Who has the time? Sadly, though, a clever virus, keylogger or Trojan that has bypassed your security software, usually due to something as simple as it not being in your antivirus's database yet, will ensure that you keep receiving those reassuring messages while it causes havoc with your machine.

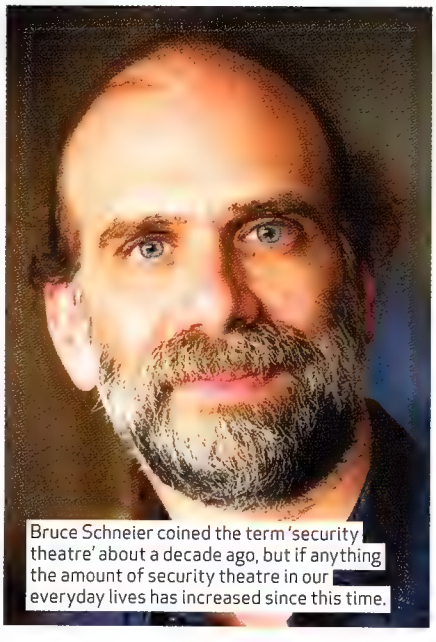


Bruce Schneier has written 13 books about security; we recommend *Liars and Outliers: Enabling the Trust that Society Needs to Thrive* for more on this topic.

But due to how we're psychologically wired, if you take all those reassuring messages away, we find it very hard to take it on trust that we're protected. For example, Microsoft's free antivirus tool Security Essentials approaches this from the other direction. Once it's installed, it just sits quietly on your machine, protecting it from internet nasties. Perfect. Except we're so used to being told that antivirus programs are running, what updates they're getting, what scans they are performing, that when that noise suddenly stops, we aren't totally confident that the program is doing its job. Without the security theatre, we aren't reassured. Questions creep in. 'Has Microsoft abandoned the project?' 'Am I really protected?' Clearly a balance between the security being provided and the advertisement of that security is needed if we're going to be confident in our security software.

BACKING UP BADLY

Another place where a lot of people wrongly feel more secure, even smug, is when they remember to back up their important files to an external hard drive due to the belief that those files are now protected. However, most people keep their external storage connected to their machines (all the better for those regular scheduled backups), which means that if the worst happens, that 1TB drive offers no protection at all. In the case of a fire, the drive is in the same place as your PC – usually on top of it! – so clearly will go up with your computer. Similarly, should your computer be infected by a malicious piece of software, that infection is likely to spread to all connected drives, including your back-up drive. Everyone knows that backed-up material should be stored at another site, but most back-up routines make that, at best, impractical. Instead, we go through the rigmarole of regular updates, waiting for files to be copied, without there being any real-world benefit if a typical catastrophe were to occur.



Bruce Schneier coined the term 'security theatre' about a decade ago, but if anything the amount of security theatre in our everyday lives has increased since this time.

Of course, the rise of cloud-based back-up services should cut out this problem (in fact, many new hard drives ship with such a service, possibly in recognition of their hardware's upcoming obsolescence) but until people become proper adopters of this relatively new technology, they're going to lose data even while congratulating themselves that they're doing everything they need to do to protect it. Sadly, too, cloud-based services are still viewed by a lot of people with suspicion. Why should you trust a large faceless corporation with all your personal files? Or, if you choose a new start-up, who's to say they'll be here in a couple of years' time? Again, it's how we perceive things that becomes the problem. If you can't see something, such as an external drive flashing its LEDs at you, if it isn't tangible, people start to worry whether it's there at all. This is compounded by the much highlighted but actually very rare stories of people losing all their Gmail messages due to someone at Google headquarters pressing the wrong button, or people's personal files suddenly being viewable to everybody online due to a software glitch. Although uncommon, the way the media report these stories is designed to strike fear into people's hearts and this causes distrust in cloud-based storage options, even though the percentage risk compared to the possibility of something going wrong on your own PC is minuscule.

GOVERNMENT INVOLVEMENT

Where security theatre really takes off in terms of cost and implementation of flawed security procedures on a major scale is when governments get involved. With multi-billion dollar budgets at their disposal, and where knee-jerk reactions to crises both real and perceived can be huge vote winners, the potential to indulge in security theatre is enormous. Kapersky Lab's David Emm agrees. "Things are perhaps different for governments [as opposed to companies], where public perception is very important," he says. "Here there is, I believe, much more scope for security theatre. The growing realisation of the potential dangers of cyber-attacks – in a world where we have all become heavily dependent on the internet – means that governments are forced to be seen to respond to the perceived risks. But even here, there may only be a problem if there's a cost in addressing the perceived problem at the expense of investing in solutions to real threats."

Force for good

Reassurance in a stressful world may be the price we pay for bad security procedures.

Security expert Bruce Schneier, although undoubtedly a critic of security theatre, is also on the record as admitting it can be a force for good, but only when it helps correct for threats that are perceived as being much greater than real statistics show they are. Using examples of security theatre such as putting RFID tags on babies to prevent them being kidnapped from hospitals (despite the fact the tags can easily be removed and often fall off the babies' arms anyway), or putting tamper-proof seals on food and medicine products (despite the fact that a syringe could still contaminate or poison the contents, leaving little trace), he explains that although a lot of money is being wasted on these procedures, compared to the likelihood of the threat being carried out, it does calm down people reacting to high-profile news stories about the one or two cases where it has happened.

As Schneier explains, "Security theatre is no substitute for security reality but, used correctly, security theatre can be a way of raising our feeling of security so that it more closely matches the reality of security. It makes us feel more secure handing our babies over to doctors and nurses, buying over-the-counter medicines, and flying on aeroplanes — closer to how secure we should feel if we had all the facts and did the math[s] correctly.

"Of course, too much security theatre and our feeling of security becomes greater than the reality, which is also bad… That's the usual way security theatre is used, and why I so often malign it."

Further to this, we asked Graham Cluley how much of the world's governments' response to hacking threats is security theatre? "We certainly see a lot of grandstanding when it comes to state response to computer security threats," he says. "For instance, we see finger-pointing at certain nations, blaming them for hack attacks or writing malware, when in fact it's incredibly difficult to prove such accusations. We know that hackers can leapfrog around the world, using multiple compromised computers to launch their attacks.

"The true nature of threats is much more complicated and less appealing perhaps to the general non-technical audience. People don't want to hear that a large amount of the problem might be poorly protected home computers in their own country, which have been compromised… and instead may prefer a story that talks about a bogeyman in an enemy state."

If this is so, we asked him how much of the need to monitor all internet communications is security theatre? "I certainly worry that fear of security threats is being used as a justification for greater monitoring of communications by governments. Often terrorism is cited as a reason why a government might want to know every web site you visit, or every time people email each other or have an instant messaging chat. But how many people have been killed by terrorists in the the last five years? Is the fear of terrorism being used as a smokescreen for greater online monitoring and a loss of liberties?"

It certainly seems to be used to justify some rather intrusive data-mining techniques, which if they really are being implemented, must be a massive drain on government resources for what must be a remarkably small success rate. For example, the US Department of Homeland Security is monitoring blogs, news channels and social media networks such as Twitter and Facebook for certain keywords that may highlight 'Items of Interest'. These IOIs could be indicators of emerging situations worthy of the government's attention in 14 different areas including, among others, terrorism, weather, natural disasters, fire, border control issues, immigration, hazardous and nuclear materials, transport security, cyber security and reports on the Department of Homeland Security and other Federal Agencies themselves. Remember, that's just the areas the keywords cover. Each area monitors its own range of keywords, usually over 30 in each, covering everything from 'dirty bomb' and 'ammonium nitrate' under terrorism to 'botnet and 'Cain and Abel' under cyber security.

Sophos's security expert Graham Cluley worries that security theatre is exaggerating the threat of terrorism, which is being used by governments to justify greater monitoring.

One way of viewing this is that it makes sense for the US government to monitor for upcoming national disasters, health crises or emerging threats and, as the information is already out there for people to see, why not utilise it? Another is that this is no doubt a costly operation, which must throw up so many false positives as to make it a virtually useless piece of security theatre. But if you believe the latter, we don't recommend you tweet about it, just in case.

THE FUTURE OF SECURITY THEATRE

So with all these examples of security theatre around us, providing the general populace with a nice warm feeling that companies, governments and even ourselves are doing all we can to make the world a more secure place, while in fact doing nothing of the sort, is there any hope for the future? What can we do to combat security theatre and just how big a problem is it? "I think security theatre becomes a problem only if the cost of putting on the production diverts investment (and not just financial) away from solutions to real problems," says Kaspersky Lab's David Emm. "One of the problems, however, is that we may only recognise something as security theatre retrospectively, not at the time the show is going on."

We'll leave the last word to Graham Cluley, who we asked whether we really need to worry about security theatre if it gives people peace of mind (see 'Force for good' above)? After all, is that such a bad thing? "I think we shoul d worry about it," he says. "There are real security threats out there, but only limited resources and time to deal with them. If we get distracted by theatre, there's a risk that we won't put the right effort, technology and people behind the things that really matter."

how to

» QUICK TIPS

Experts solve your computing problems

APC and its readers can be one giant helpdesk. If you have a technical problem, chances are one of us can solve it.

HARDWARE

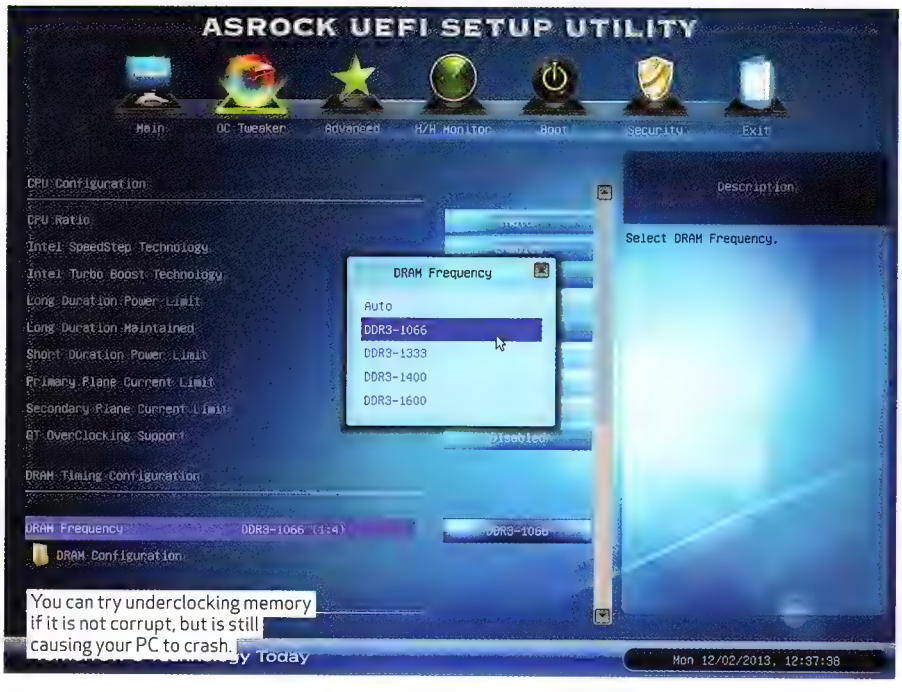
MEMORY UPGRADE QUERY

I recently built myself a new computer with an ASRock B75-Pro3M motherboard. I've tried reusing an 8GB stick of DDR1333 RAM from my old PC, but I keep getting BSOD errors during use. I've checked these out using WhoCrashed (www.resplendence.com/whocrashed), but there's no single cause. I'm pretty sure the memory's responsible, but is there some way I can make it more stable to save me buying new RAM?
Toni Rye

Ideally, you should always buy memory using the memory retailer's own system checking tool to ensure that it's 100% compatible with your computer and its other components. That way, if you run into problems, you can blame the stick of RAM itself.

Toni revealed that the stick still worked fine in her old computer, and passed all memory checking tools, although it did freeze during an extended check on one machine, which implied problems with memory timings.

We suggested going into the motherboard's BIOS, then selecting 'OC Tweaker' followed by 'DRAM Frequency'. Change this from Auto to 1,066 – the lowest possible setting. On saving her changes and exiting, Toni reported that the system appeared to be much more stable, but we'd still recommend replacing that stick of RAM sooner rather than later.
APC staff



EMAIL

BEST EMAIL SOLUTION FOR A MIXED MAC AND PC OFFICE?

I use my Mac in a small office with MS Small Business Server/Exchange. Should we stick with MS Office for Mac with Outlook, or are we better to shift to Mac Mail/Calendar/Address Book? I've used Outlook and Entourage before, but there were shortcomings. My colleagues use Outlook in Windows 7 (on their Macs). They also have to use Windows to run Autodesk Revit, a CAD app for architecture.
Fred Batterton

Outlook is slower to start than Mail and doesn't sync mailboxes as smoothly. OS X Mail is great if you use a IMAP or POP email service, such as Gmail, but it doesn't cooperate as nicely with enterprise messaging software like Exchange. I imagine CAD software loses performance if it runs in a virtual machine, which means your colleagues are using Boot Camp to run Windows natively. It's annoying to boot between Windows and OS X to check email, so they'll be sticking with Windows. Have you tried Outlook Web App? This can be accessed from any web browser (or iOS) and it integrates with Exchange – it's an acceptable compromise.
Luis Villazon

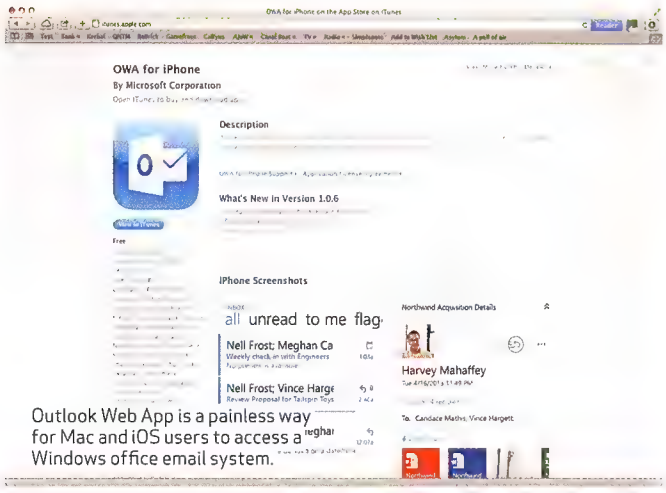
SOFTWARE

WINDOWS UPDATE WOES

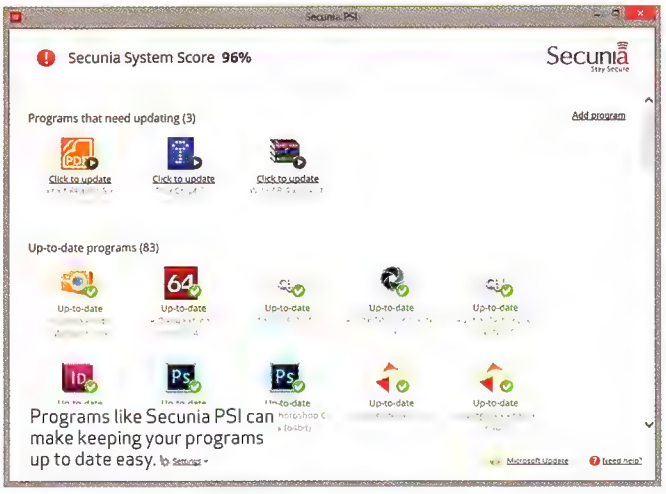
My PC has been having freezing every now and again, and my friend who helped me build it using said that I have a lot of stuff that's not updated. I thought whenever Windows updates that it updates all programs on the computer, but I guess I was wrong. So my question is this: What program do you recommend I use to monitor the programs and drivers on my computer to keep them updated?
Peter Fraiser

Keeping all your programs up to date is of critical importance. Malware authors target these programs (as well as Windows) to exploit vulnerabilities in them, so frequent updates are the only way to keep your system safe and running at top speed. As far as the Windows Update program goes, it's a selfish program in that it only updates itself and other Microsoft programs such as Bing Desktop. We always recommend that you let Windows Update download updates for you, but then going through and installing them manually.

In terms of third-party software though, Windows Update totally ignores installed programs, so to keep them up to date you'll need to run a separate utility. There are a lot of paid apps out there that do this, but we've never used any of them. Our favourites are both free – SlimDrivers (**www.driverupdate.**



Outlook Web App is a painless way for Mac and iOS users to access a Windows office email system.



Programs like Secunia PSI can make keeping your programs up to date easy.

> "In terms of third-party software though, Windows Update totally ignores installed programs, so to keep them up to date you'll need to run a separate utility."

net) and Secunia Personal Software Inspector (aka PSI, available from **secunia.com**). SlimDrivers just shows you what drivers need to be updated, if any, and lets you update them right from the utility. You can also schedule it to check for updates on a daily or weekly basis. And if things go sideways after a driver install, it lets you uninstall drivers and restore older drivers from backup. Secunia PSI is a second option, and it's a hands-free updater in that it updates programs for you, unless for some reason the programs don't allow that to occur. In those cases, PSI notifies you from the system tray that you need to update them yourself. Both programs get the job done well and are free, so there's no harm in trying them out.
APC staff

WINDOWS

WHAT DOES THE (X86) MEAN?

Why are there two Program Files folders on my hard disk? Program Files (x86) is 110GB on my system whereas Program Files is only 508MB. They seem to have several duplicated folders inside them. Do I really need both? Is there some way to merge them together?
Taj Suleiman

The short answer is the Program Files (x86) is for 32-bit applications and Program Files is for 64-bit apps. The short version of the really, really long answer is that 32-bit apps can't load 64-bit DLLs and will crash if they try, so they need to be kept separate. There are lots of 32-bit apps around that predate 64-bit operating systems, so they don't know that 64-bit DLLs are even out there and will trustingly try and load the first file they find with the right name. There are several ways this problem could have been solved but the one that Microsoft chose was to create two top-level folders and when a program installer calls the SHGetKnownFolderPath function, Windows checks whether the installer is 32-bit or 64-bit and returns the path to the correct Program Files folder for that application. Program Files (x86) is much larger on your PC because there are still an awful lot of 32-bit apps out there.
Luis Villazon

HARDWARE

SSD FORM FACTOR CONFUSION

I've just completed a new Haswell build with an MSI Gaming Series Z97 motherboard, which has an M.2 interface. I'm a little confused about what exactly I'll get over a regular 6Gbps SSD using M.2. And I don't quite get which is better: M.2, SATA Express, or the PCIe SSDs that I've seen popping up in a few articles lately. Since I have the M.2, I've been looking around and trying to find one (and can't), but now I'm thinking I probably don't need it anyway (and do they fail easily?). Can you give a layman's explanation on the benefits/differences of these three formats, and why I would need an even faster storage device? My Samsung 240GB 840 EVO is already plenty fast, for me at least.
Ken Browning

Things are a bit confusing right now in the SSD world because we're seeing the final days of SATA as an interface for storage, while simultaneously witnessing the transition to PCI Express-based devices like M.2 and PCIe SSDs. These transitions take time, and if you recall when SATA first arrived, all hard drives had both SATA and PATA connectors on them for a year or two before the PATA connectors finally disappeared and everyone was onboard with SATA. The same situation will likely play out in the SSD world, where we'll see SATA stick around while we wait for everyone to get on the PCI Express train. In the meantime, a lot of motherboards are expected to use a PCI Express interface for SATA drives named SATA Express. Just like its name implies, SATA Express is a bridge between the old SATA interface and the next-gen PCI Express drives. It allows a SATA drive to connect to a motherboard's PCI Express lanes, and will also eventually allow PCIe drives to connect to it as well. Your M.2 drive is a full-blown PCI Express drive though, so unlike SATA, which is capped at roughly 550MB/s, PCI Express can scale much higher, and will allow us to quickly and easily double and triple the amount of bandwidth available for data transmission. For what it's worth, M.2 currently supports faster speeds than SATA 6Gbps, but only up to around 800MB/s at this time, so we doubt it will "feel" any faster than your 840 EVO. One other thing to note is that SATA drives use the AHCI protocol to talk to the OS, but that's a protocol designed in the hard-drive days. When PCI Express comes online for real, we'll see a new protocol named NVME, which stands for Non-Volatile Memory Express. This protocol is designed specifically for solid-state drives, and will allow for major increases in performance in the future, as it gives the drives more headroom to run as fast as they can instead of being hobbled by a hard-drive protocol.

Create a slimmer, faster Windows 7

If you're in search of a leaner, cleaner and ultimately faster machine, follow these handy tips from Christian Hall for keeping Windows 7 working at peak performance.

When it launched Windows 7, Microsoft prided itself on having made the new operating system far less bloated than Windows Vista and XP. This meant it ran better than those earlier versions, but there's still lots of room for improvement.

Whether you think it's time you reinstalled your OS for improved performance, or you want to help speed it up after a reinstall, we'll guide you through a variety of methods that will ensure you're using a lean, fast version of Windows 7 for as long as possible.

We'll start with making a slimmed down installation for those who want to take the plunge and reinstall everything on their PC. This will ensure that from the start you get a smaller footprint than you would if you simply got out your original Windows 7 installation disc and reinstalled from there.

We'll then move on to some more general decluttering tips that will help keep your trimmed Windows 7 install in check. Let's get cracking...

Jargon buster

ISO

ISO files are archive files on a disc, which are bootable. You can copy ISOs to USB sticks and boot from them as well.

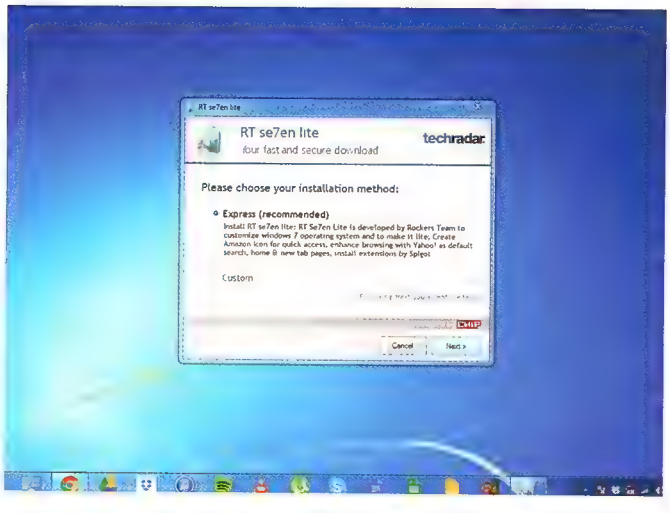
Slipstreaming

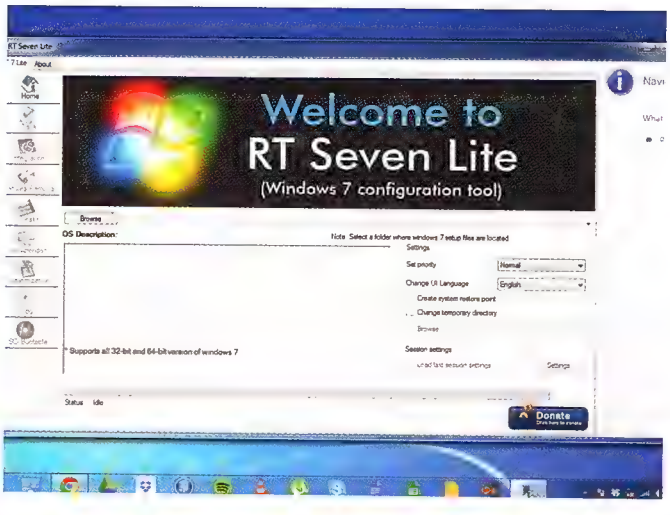
This term refers to packaging up a selection of updates in a Windows Service Pack together into one disc image (see ISO, above).

Hibernation

This saves your current system state to a file on your hard drive before powering off so it starts more quickly next time.

Declutter your Windows 7 installation



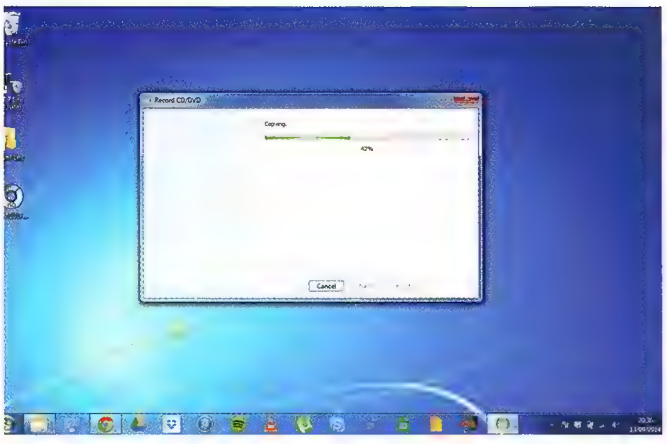


1 TRIM YOUR REINSTALL

There are many tools that can help create a slimmer Windows install for you, but we're going to use RT Seven Lite (**www.techradar.com/downloads/rt-se7en-lite**). Download and run it. Choose 'Express' as the install option, then click Next on each following screen to complete the process. Now it's time to grab that Windows installation disc.

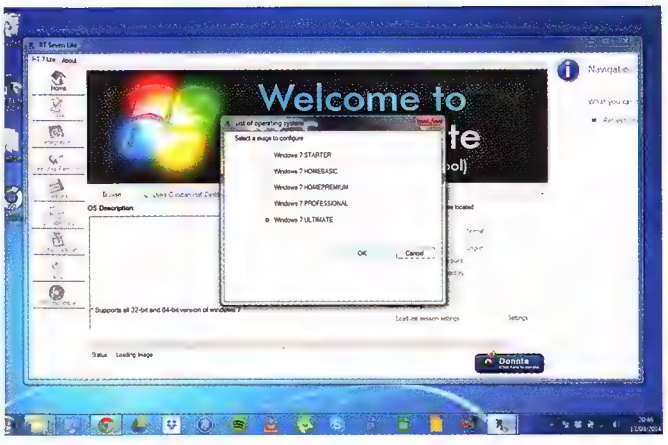
2 CREATE TEMPORARY FOLDER

You'll now be presented with the RT Seven Lite interface. You will need to extract your Windows 7 disc files somewhere in order to use the program to edit them, so before you create your slim install, make a temporary folder on your desktop called Win7 Lite (or similar). Don't worry about making extra clutter — you'll be able to delete this folder when you've finished.



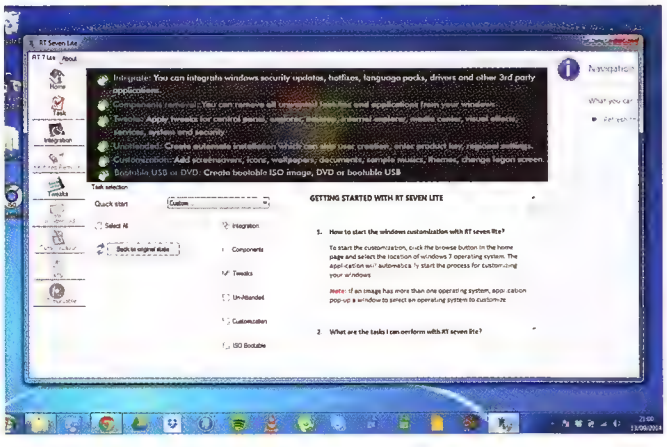
3 CREATE AN ISO

Click the 'Browse' button on the main page and find your Windows 7 ISO. If you have a physical Windows 7 disc, you'll need to create an ISO using ISO Recorder (http://bit.ly/1qIb4kO). Install it, then right-click your DVD drive and choose 'Create image from CD/DVD', pick a path and click 'Next'.



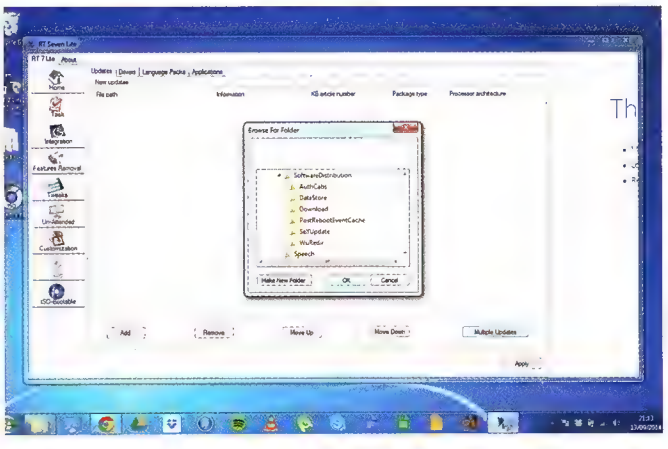
4 SLIPSTREAM THE SERVICE PACK

Back in RT Seven Lite, select your temporary folder as the extract path and click OK. When it asks which image to configure, choose the correct Windows version. If you want to slipstream Service Pack 1 into your disc, check the 'Slipstream Service Pack' box at this step — it can't be done later.



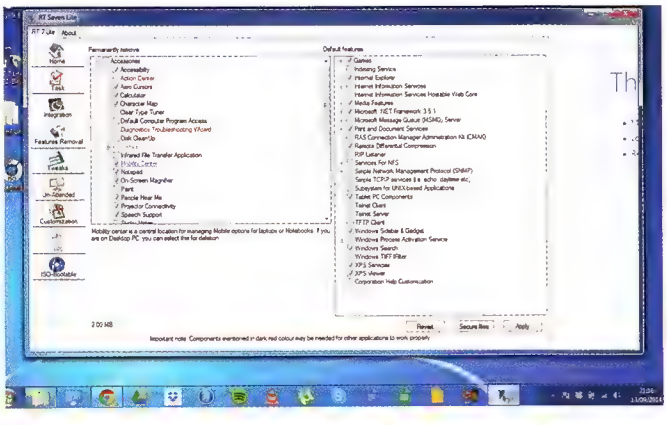
5 TWEAK THE INSTALL

When the process is complete, you can begin tweaking. Click the Task button in the left sidebar. From here, you can choose which portions of Windows you want to customise. You have six checkboxes on this page, which correspond to the six sections on the left sidebar of the app.



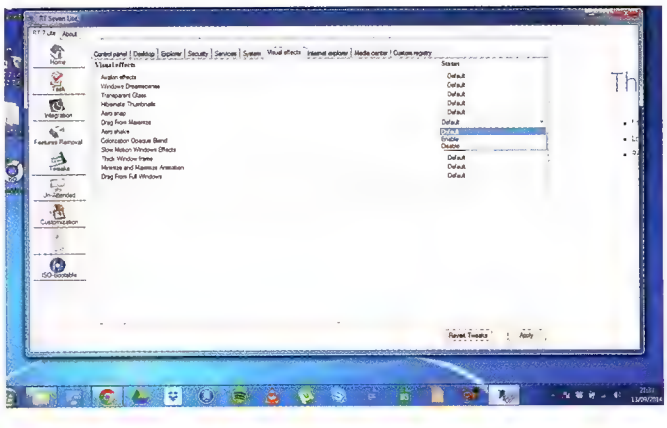
6 INTEGRATION

Only the options selected will be highlighted in the left sidebar. The first (if you've chosen it) is Integration. If there are certain updates that you really need in the original installation, you can choose them here. Updates is the most important, so go to the appropriate tab, choose Add and then navigate to C:\Windows\SoftwareDistribution\Download to select it.



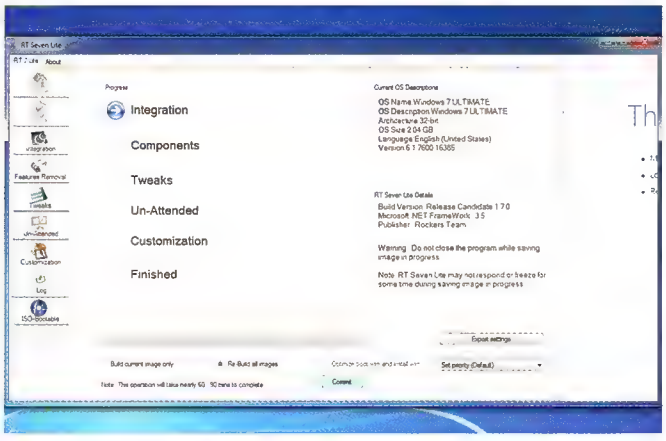
7 REMOVE FEATURES

This is a very important section, which lets you remove applications and other features from Windows to make it more lightweight. The left box lets you check boxes to permanently remove apps, while the right box lets you uncheck boxes to merely disable certain features. If you're not sure what a program or feature does, a description is given for each.



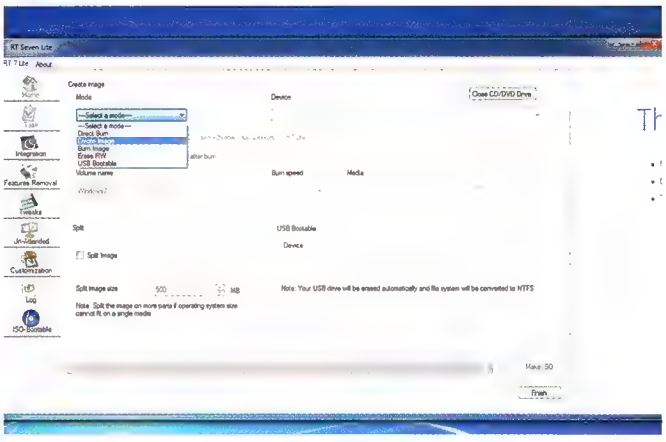
8 FINAL TWEAKS

Click the Tweaks tab to make further changes. There are 10 different categories to choose from here. The worst offenders in terms of 'bloat' are under the heading Services. Before you burn the disc, visit the 'Un-attended' tab, where you can enter your product key so it activates automatically after you install Windows, saving you time and hassle.



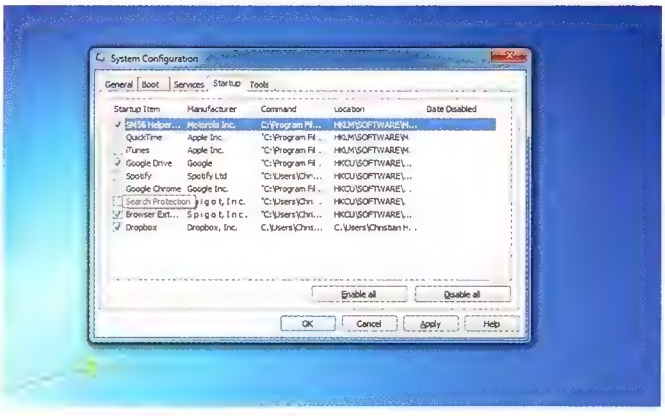
9 PREPARE TO BURN

When you're done, go to the Log section and click Commit. This will make all your changes in the temporary folder you created on the desktop. The process could take up to an hour or more, depending on how much you've tweaked. You can also click 'Export settings' before Commit, which will save the tweaks in case you want to come back and edit them later.



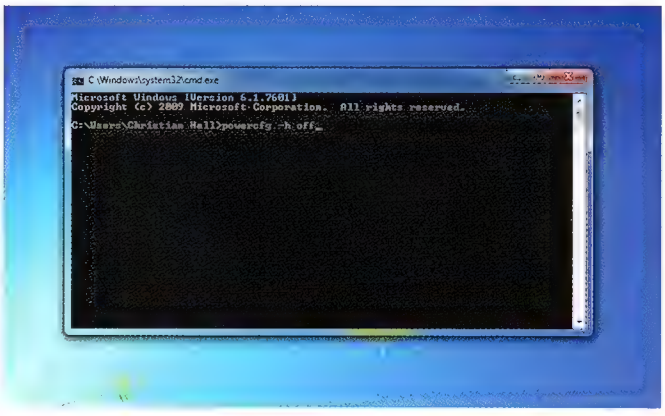
10 CHOOSE INSTALL VERSION

Now you're ready to head to the ISO-Bootable section and create your custom installation disc (or USB stick, if you prefer). Under Mode, you can choose 'Direct burn (DVD)', 'Create image (ISO file)' or 'USB bootable'. Give the volume a name, then hit Finish. You can split the install across discs or USB sticks if it's too large for the one you have.



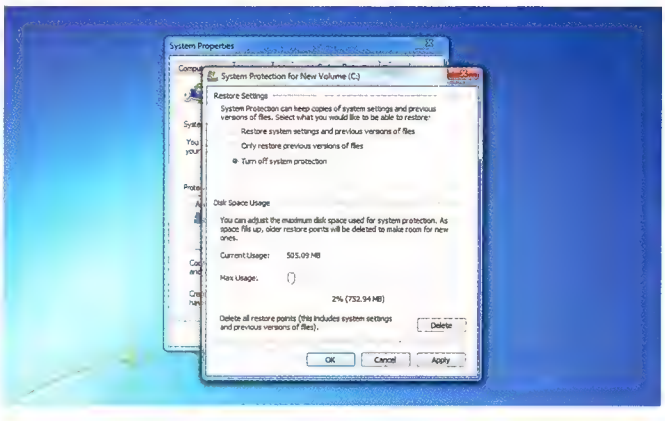
11 START MENU ITEMS

Once you've installed your new, slim version of Windows, you can make some post-install adjustments. Speeding up boot processes is a classic. To do this, open System Configuration (type `msconfig` in the Start Menu's search box and press Enter) and go to the Startup tab. Simply uncheck any items you don't want and click Apply when you've finished.


C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Christian Hall>powercfg -h off

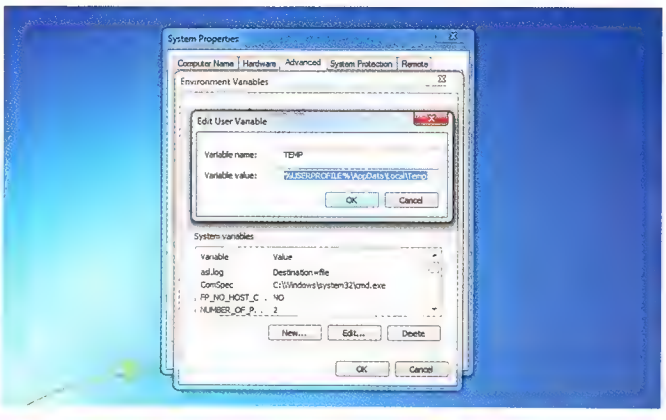
12 DISABLE HIBERNATION

If you have a Windows 7 laptop and don't tend to use its hibernation feature, you can type `powercfg -h off` into the command prompt (type `cmd` in the Search box and hit Enter). Doing this will disable hibernation and delete the hiberfil.sys file, which can be a few gigabytes in size depending on the amount of RAM installed in your system.



13 SWITCH OFF SYSTEM RESTORE

Another way to save space is to turn off System Restore completely. Open the Start menu, right-click and choose 'Properties > System Protection'. In the new window that appears, click Configure and in the next Window select 'Turn off system protection' and then click OK followed by Apply. You can go back here to re-enable it if you change your mind.



14 SLIM THE WINDOWS 7 PARTITION

You're almost finished, but there's one more simple trick you can try. You can move some Windows system files to a new partition without reinstalling. Go to 'Control Panel > System > Advanced system settings' and click 'Environmental Variables'. Now just point the value of the variables TEMP and TMP to another partition on your PC and hit OK. ■

disc contents

» OUR SELECTION OF EXCLUSIVE FULL-VERSION PROGRAMS

ISSUE 409, DECEMBER 2014

Make your own mini apps

Get productive with shortcut programs thanks to Ashampoo Gadge It

FULL VERSION WORTH $14

Ashampoo Gadge It enables you to create desktop app (gadgets) and browser menus for your Windows PC. With a gadget you gain easier and quicker access to, for example, the folder with your favourite videos and a frequently visited web site, or you can send emails directly from the desktop. The buttons in your gadgets can be linked to several functions. With Ashampoo Gadge It you can design gadgets individually. Among other things, you can choose between different buttons, add your own pictures or background music. There are no limits to your creativity. Ashampoo Gadge It provides different design themes for quick results. Create your personal gadgets and browser menus and bring more functionality to your desktop!

Tune up & optimise

Maximise your PC's performance with Abelssoft PC Fresh 2014

FULL VERSION WORTH $43

Tune your PC just like experts do. Customise the look and feel of your OS and speed up your programs using the turbo mode. The customise module provides access to a large number of settings which can affect the appearance and behaviour of your system. It lists all startup applications and you can disable all that don't fit your needs. Defrag your hard disk, optimise memory and, turn on turbo mode for maximum performance.

Speed up your PC

Accelerate your boot process with 1-abc.net Startup Booster 6

FULL VERSION WORTH $21

When Windows starts, it checks for registry entries that allow the system to execute files and programs automatically. One problem is that many programs don't delete their startup entries correctly when uninstalled. 1-abc.net Startup Booster lets you configure these startup entries easily. It also allows you to add customised entries easily for other automated programs, ie. schedule defragging, calendar programs etc.

PLUS! BENEATH A STEEL SKY: FULL GAME & WINDOWS BOOSTER TOOLKIT

SYSTEM REQUIREMENTS

- A DVD-ROM reader or burner.
- The *APC* disc is designed for use with up-to-date browsers (for example, Internet Explorer, Chrome, Firefox).
- The interface included on the *APC* disc requires a JavaScript-enabled browser.
- An internet connection may be required for online registration of software before use.
- The software packages on the *APC* disc have different system requirements. Software is included on the disc for Windows XP, Vista, 7 and 8.

BEFORE INSTALLING

- Check the disc using a virus scanner complete with the latest antivirus data updates. The disc was checked before burning, but new viruses are being discovered all the time.
- Back up any important system and data files. It is not recommended that the software contained on these discs be installed on production machines.
- If you have any questions regarding the use of the *APC* disc, click the 'Help' button at the top of the screen.

USING THE DISC

- Insert the disc into a CD/DVD-ROM reader or burner and your web browser should automatically load the interface. If not, launch your web browser and load the default.html file from the root directory of the disc.

HELP

- If you have any problems with the *APC* disc, please visit **www.apcmag.com/disc.htm**.
- *APC* provides no technical support for this disc or any software provided on it.

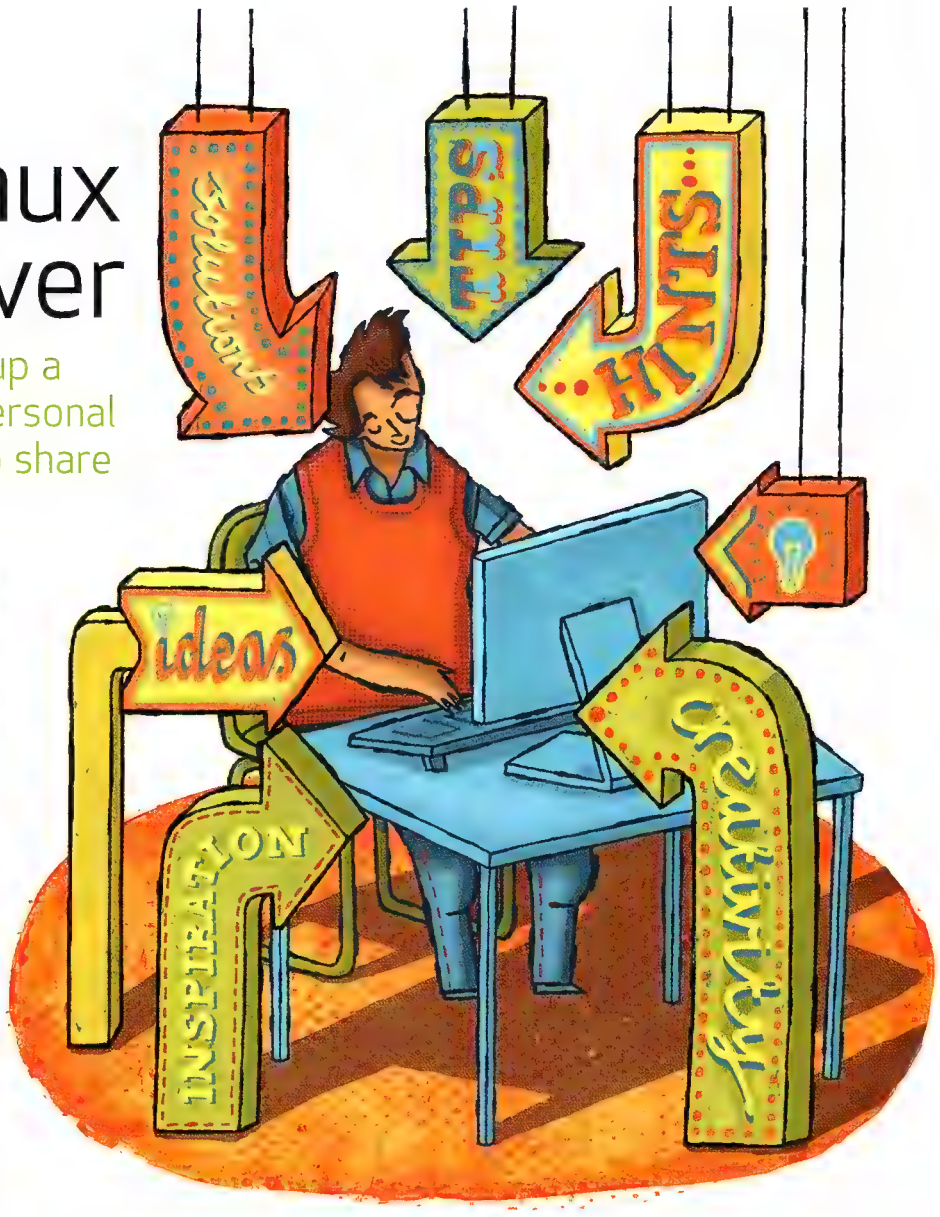
NO DISC?

Please note the free cover disc is not included with digital editions or bundled promotional copies of *APC*.

DISCLAIMER Future Publishing is not the licensor of the software and documentation on the enclosed disc (the 'software'). Rather, Future is merely a distributor of the software, and your use of the software is subject to any accompanying third party licence terms. You must carefully read and comply with any such third party licence terms, together with all instructions and README files that come with the software. Accordingly, to the maximum extent permitted by law, all software is provided by Future 'as is' and without warranty either express or implied, and Future will not be liable for any damage that you may incur as a result of using the enclosed disc. You should back up any important system and data files before using the enclosed disc. We recommend that you do not use the enclosed disc on a production machine. Nothing in this disclaimer excludes any warranty that may be implied by statute, which may include the Trade Practices Act. Notwithstanding the foregoing, if the enclosed disc is faulty or damaged, we will replace them for you. While we have taken all reasonable steps to check the enclosed disc for viruses, we cannot guarantee that it is free from viruses or other harmful code and you should check each disc using a virus scanner complete with the latest antivirus updates before use.

Build a Linux photo server

Mayank Sharma powers up a lightweight web-based personal Flickr to show you how to share all your pics.



There are lots of online services that you can use to share your photos at no cost. But these web sites are primarily designed for sharing photos with your online social network. While some do offer quite fine-tuned privacy options, they aren't an ideal place for sharing more personal photos with family and close friends. The perfect way to store and share personal photos without losing control over them is to host them yourself. This does require a little bit of extra effort, but it keeps you in charge of your photos and, once it's fully set up, you get pretty much the same level of convenience that you would expect from leading photo hosting and sharing services.

To deploy web album software, you need a web server. That's a job even the Raspberry Pi can do, so that's what we've used, although any Linux PC will do. Although you could run the popular Apache web server, we're going to using the lightweight Nginx web server here to make best use of the limited resources on systems like the Pi.

We'll be using the Lychee web application to host, manage and share our digital photos. Compared to some other software that offers similar functionality, Lychee is lightweight, it's simple to set up and it has a very intuitive and pleasing user interface.

Begin by powering up your Raspberry Pi and updating it with `sudo apt-get update`. You can configure and set up Lychee from a remote computer by logging into the Pi via SSH from a remote computer on the network.

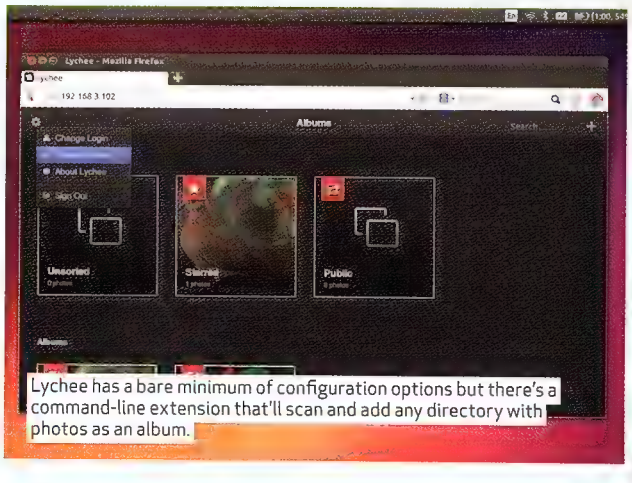
Extend Lychee

You can extend your Lychee setup to automatically sync with a cloud storage service such as Google Drive or Dropbox.

Since both these services don't have an official client for the Raspberry Pi, you'll have to use custom scripts. Visit **tinyurl.com/p43dfn7** and you'll find several methods to sync a directory on your Raspberry Pi with an online duffel bag.

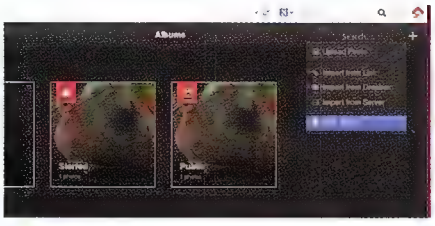
If you want to sync the photos to a Google Drive account, you'll need to use the Grive script. The page has detailed instructions on compiling the script from source because it isn't available on Raspbian. Once you've installed the script, run it from inside the folder that houses your images, and it will spit out a URL that gives you an authentication code that you need before you can sync files.

Similarly, you can use the dropfuse script to share your pics with a particular Dropbox folder. The script doesn't share your entire Dropbox folder and can connect only to transfer files to a particular folder.

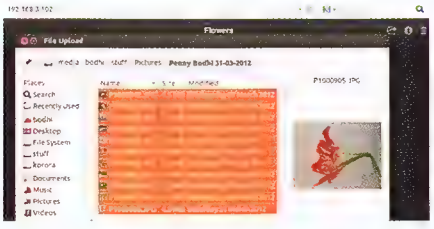


Lychee has a bare minimum of configuration options but there's a command-line extension that'll scan and add any directory with photos as an album.

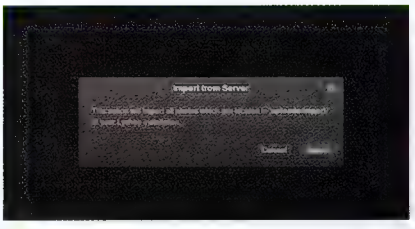
Transfer photos on to Lychee



1 CREATE AN ALBUM
To upload your photos, click on the '+' icon in the top-right corner of the Lychee web interface. If you haven't yet organised the photos into categories, you can use the 'Upload Photo' option to import photos into Lychee and then categorise them into albums later on. Any photos that are not uploaded to a particular album are filed under the 'Unsorted' smart album.



2 UPLOAD FROM DISK
You can also use the 'New Album' option to create an album. The 'Upload Photo' option will launch the file manager, which you need to use to navigate to the photos that you wish to upload. You can either select an individual photograph or use the Shift and Ctrl keys to select multiple photos. Lychee will then upload them to the server and process them.



3 IMPORT
In addition to adding photos from disk, Lychee can also import them from other sources. The '+' icon has options to directly import photos from a URL as well as Dropbox. If you prefer, you can also use any FTP client to transfer images to Lychee's uploads/import directory and then use the 'Import from Server' option to import any images located here.

For this project, let's assume that 192.168.2.100 is the IP address of the Raspberry Pi. You can log into it from a remote computer with: `sudo ssh pi@192.168.2.100`

Enter the command and you'll be prompted for the password of the pi user before you are logged in.

Once the package lists have been refreshed, install the PHP scripting language and the required libraries with this code:

```
sudo apt-get install php5-fpm
php5-gd libgd2-xpm libpcrecpp0
libxpm4
```

Then install the web server software with: `sudo apt-get install nginx`

Finally, install the MySQL database server and hook it up with PHP with:

```
sudo apt-get install mysql-
server php5-mysql
```

During installation, you'll be prompted to set up a password for MySQL root user. You'll need this password later on to create a database for Lychee.

Now let's edit PHP's configuration file to change the value of certain parameters from their conservative defaults so that we can use Lychee without restrictions. Open the configuration file using the nano text editor with: `sudo nano /etc/php5/fpm/php.ini`

Now use Ctrl-W to search for the following variables and change their default value to match the following:

```
max_execution_time = 200
post_max_size = 200M
upload_max_size = 200M
upload_max_filesize = 20M
max_file_uploads = 100
```

Add a new entry for any variables that don't exist. When you have finished changing their values, scroll down to the end of the file and add the following lines to activate the required extensions:

```
extension = php_mbstring.dll
extension = php_exif.dll
extension = php_gd2.dll
```

Save and exit with Ctrl-X and restart the PHP service with: `sudo service php5-fpm restart`

When you've set up the infrastructure components, create a directory to house the files for Lychee with `sudo mkdir /var/www`. Then change into this directory and install the Git software with `sudo apt-get install git`.

Use the software to get the latest version of Lychee with: `git clone https://github.com/electerious/Lychee.git`.

This will download files in the /var/www/Lychee directory.

After the files have been downloaded, hand the ownership of the directory to the web server's user with: `sudo chown -R www-data:www-data /var/www/Lychee`

Also make the uploads and PHP folder and files inside them world-writable with `chmod -R 777 uploads/ php/`.

With the software in place, it's time to make Nginx aware of its existence. To do this, edit its configuration file with: `sudo nano /etc/nginx/sites-available/default` and add the following to point to your Lychee installation:

```
Server {
root /var/www/Lychee;
index index.php index.html
index.htm;
  location ~ \.php$ {
     fastcgi_pass unix:/var/
run/PHP5-fpm.sock;
     fastcgi_index index.php;
     include fastcgi_params;
  }
  }
```

Restart the web server with `sudo service nginx restart` to bring the configuration changes into effect. Now launch a web browser and point it to the Lychee installation on your Raspberry Pi at 192.168.2.100 or as appropriate.

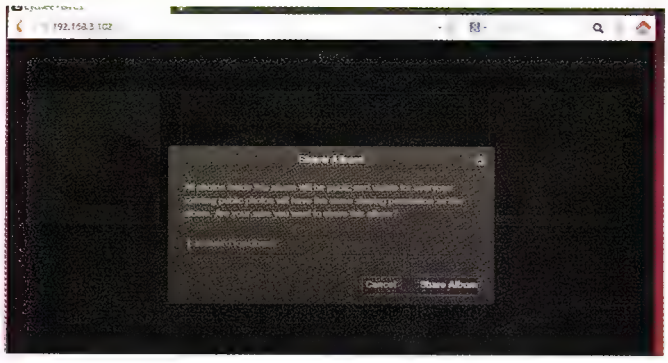
As this is a pristine installation, Lychee takes you through its brief configuration and setup process. In the first screen, it prompts you for the connection and authentication details for the MySQL database server. Use localhost as the host and root as the username. In the password field, enter the password you created earlier when installing MySQL server.

You can also ask Lychee to use an existing database, though it's best to leave the database creation to Lychee. Hit Connect to move to the second stage of the installation. Now you're asked to create a username and password for accessing and administering this Lychee installation. When you're done, click Create Login to complete the process.

That's all there is to it. Lychee connects to the MySQL server and creates a database for itself, and also creates your user credentials, which you can use to upload and manage your photos. When it's done, Lychee automatically logs you in to the main interface. From here you can use the software to create albums, upload and share photos, and administer your Lychee installation.

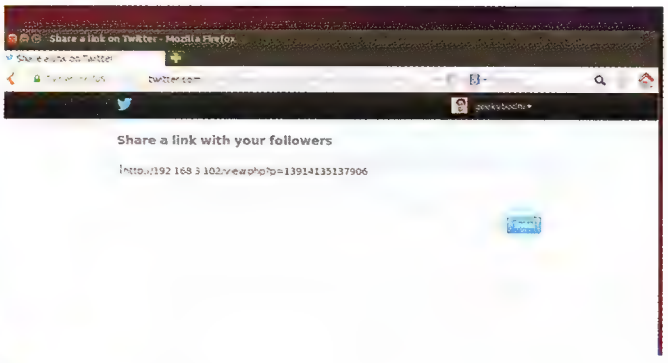
Open up albums

Share photos with friends and family.



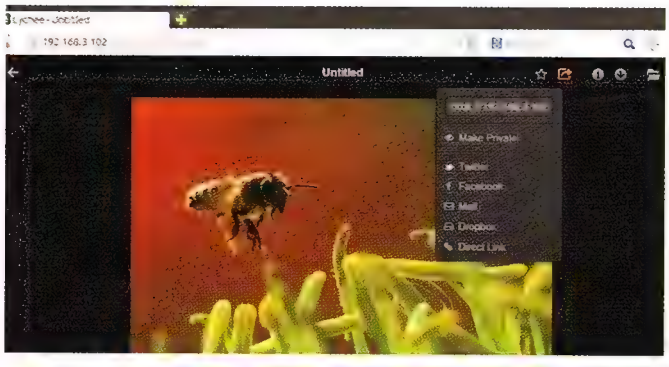
1 SHARE ALBUM

While browsing an album, you can click on the share icon in the top-right corner of the interface. This gives you a rather long URL that you can then pass on to others. Bear in mind, though, that this URL will be accessible only to users within your network. If you want users outside your network to view the URL, you'll have to poke holes in your router's firewall to allow access.



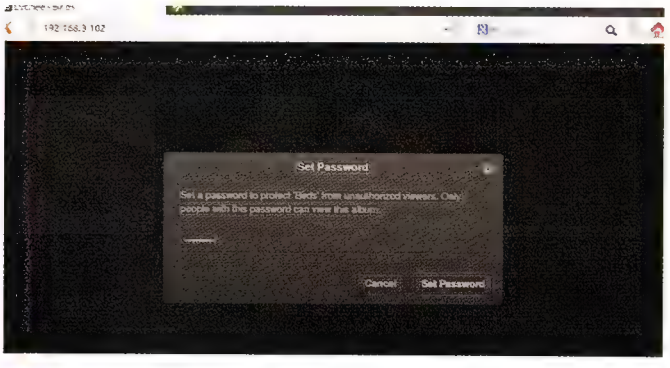
2 SHARE EASILY

To ease the process of sharing the URL, you can share it on Twitter or on Facebook from within Lychee itself. The share icon offers options for posting the URL directly as a tweet or as an update on Facebook. Furthermore, if you use the Mail option, Lychee will fire up your default email client and compose a new message for you containing the URL of the shared album.



3 SHARE PHOTO

Just as with albums, you can also share individual photos by selecting the share icon while browsing individual images. Again just as with albums, you get options to share the URL of the photograph on Twitter, on Facebook and via email. Additionally, you also get an option to upload the image to Dropbox, as well as an option that displays the direct URL to the photo in a new tab.

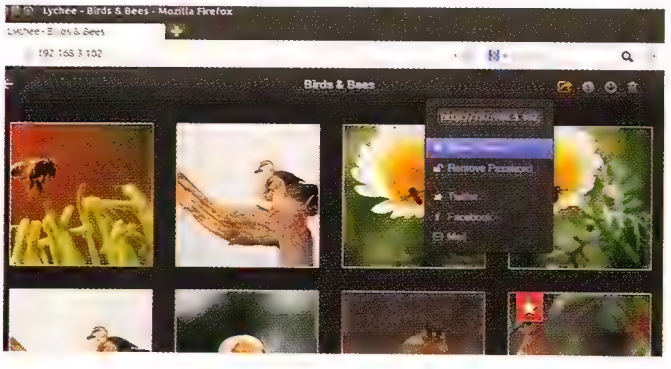


4 PASSWORD PROTECT

As an additional measure of security, when you share an album, Lychee will ask you to restrict access to it by protecting it with a password. This is purely optional and can be skipped. However, if you decide to restrict access with a password, you'll find the option to set a password in the share icon. Note that you can password-protect albums only and not individual photos that you've shared.

5 PUBLIC ALBUM

When you share a photo, Lychee will stamp an icon on its thumbnail to specify that the photo is available to the public. In addition, for easier access, the software also groups all shared albums and photos inside the Public smart album. All public albums are visible to all users on your network on the landing page of your Lychee server.

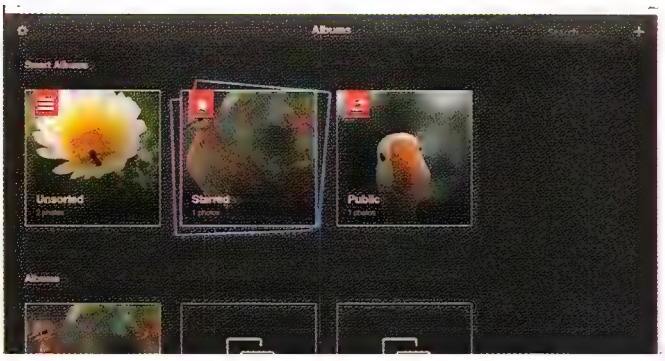


6 STOP SHARING

The 'Make Private' option enables you to revoke the permission of a shared album or single photo. When you stop sharing a photo or album, Lychee will automatically remove it from the Public smart album and remove its public badge as well. Note that you can't make individual photos inside a public album private: you will have to change the visibility of the complete album.

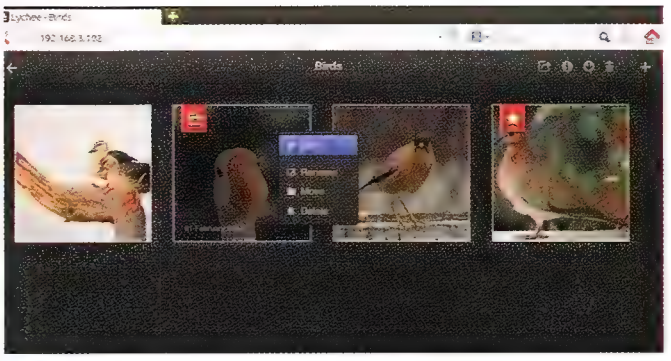
Bring order

Sort and edit your albums.



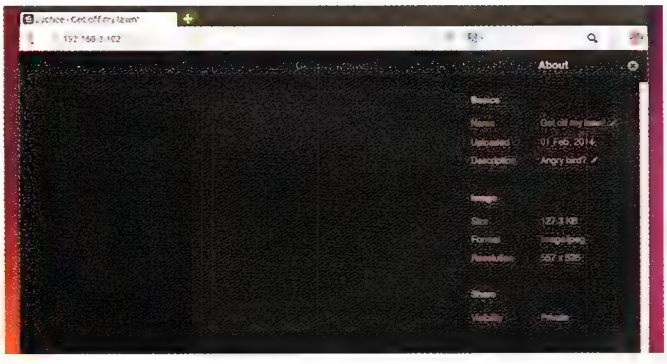
1 SMART ALBUMS

For easier management, Lychee has a bunch of virtual directories called smart albums, which house photos that aren't necessarily inside a single directory. One such directory labelled Unsorted will house any photos that aren't grouped inside any album. The Starred album lists images that you have marked, and the Public directory has images that have been shared.



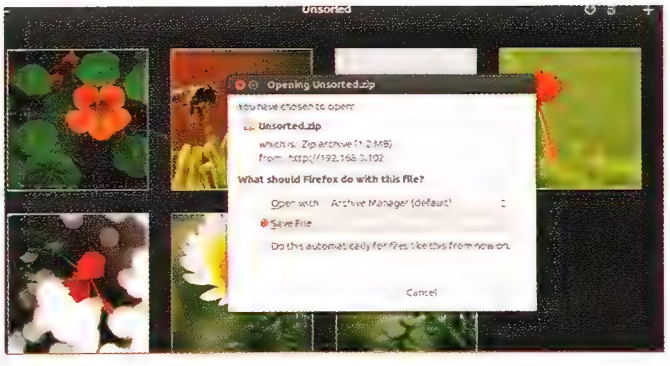
2 ARRANGE PHOTOS

Once you have uploaded an image into Lychee, you get several options to file them properly. The top-right corner in the main screen of the interface has a Search box to help you find images. While viewing a gallery, you can right-click on a photo and access options to rename it or move it to another album. From here you can also delete a photo from the server or highlight it.



3 SHOW AND EDIT EXIF DATA

Most images have some metadata associated with them, known as EXIF data. Along with the images, Lychee imports this metadata too. To view an image's EXIF data, open the image and click on the 'i' icon in the top-right corner. In addition to displaying the EXIF data, you can also click on the pencil icon to edit certain bits of information, such as the name and description.



4 TRANSFER PHOTOS

Using the down arrow button, you can download individual photos in full-resolution as well as entire albums in a compressed ZIP archive. To ease the transfer of photos to Lychee, you can also use any FTP client and upload them to the upload/import directory under the Lychee installation. The web interface has an option to import images specifically from this directory.

Use your Pi as a photo frame

After installing Raspbian and refreshing its repositories with `sudo apt-get update`, install the Quick Image Viewer with `sudo apt-get install qiv`.

Now create an images/ directory under the home directory (/home/pi) and transfer all your images here. Then open a text editor and create a file called photoframe with the line:

```
qiv --fullscreen --slide
--random --delay=10 /home/pi/
images/*
```

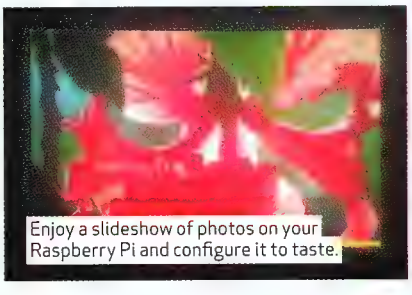
This runs through all the images in the directory in a random order and displays each one full-screen for 10 seconds. Save the file, exit the text editor and make the script executable with `chmod +x photoframe`. Now look for a file called .xinitrc inside your home directory (/home/pi), and if it doesn't exist, create it and add the following line to the file: /home/pi/photoframe

Start the X server with the `startx` command and it automatically launches the slideshow.

If you have lots of images, you can use a USB drive, but make sure the drive is mounted at the same location for the script to find the images.

Plug in the drive and find its location by scanning the last few lines of dmesg. Find the unique UUID of this drive with `ls -l /dev/disk/by-uuid/` and create a mount point for the drive with `sudo mkdir /media/usb-images`.

Finally add the following in /etc/fstab to mount this drive automatically: UUID=E352-47DC /media/usb-images vfat default 0 2. This will ensure that the USB device is always mounted at /media/usb-images. You can now point to this location in the photoframe script. ■

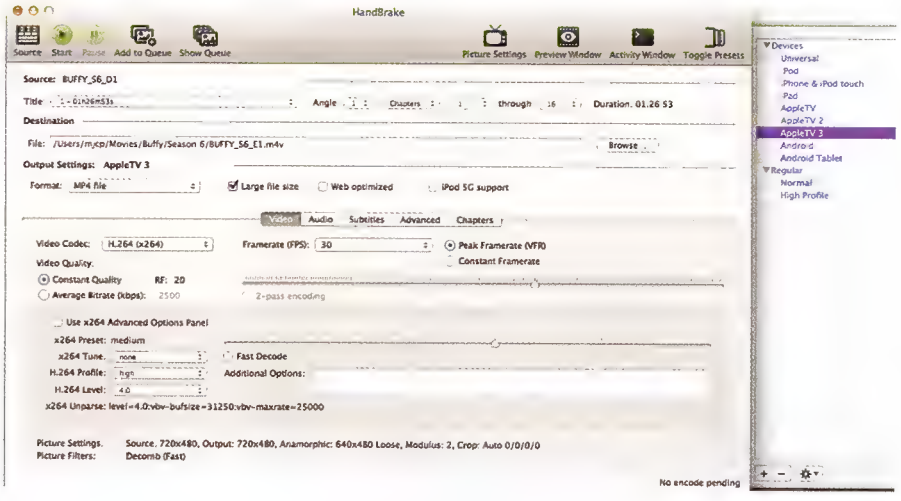

Enjoy a slideshow of photos on your Raspberry Pi and configure it to taste.

Move your DVDs to iTunes for sharing

Your movie and TV collection is useless if it's locked in physical media, but the convenience of iTunes Home Sharing can unlock it. Matthew JC. Powell shows you how.

Charles Dickens said it best: "The law is a ass – a idiot". For over a decade now we've had the right to format shift our music from CD to MP3 and other digital formats to share around the home and on mobile devices, and tools like iTunes make it ridiculously simple to do. Yet the same cannot be said for movies and TV shows. The law remains at best ambiguous on saving video content you buy in physical format into digital formats, and for that reason the tools are not as straightforward.

But they exist, and you ought to have the right to use them. Particularly if you've become so accustomed to the convenience of watching content on your iPad or Apple TV streamed via iTunes that all those DVDs you bought are gathering dust on shelves.



So many options. Handbrake allows you to set the exact parameters of the video files you create from your discs, but also includes handy presets so you don't have to tinker.

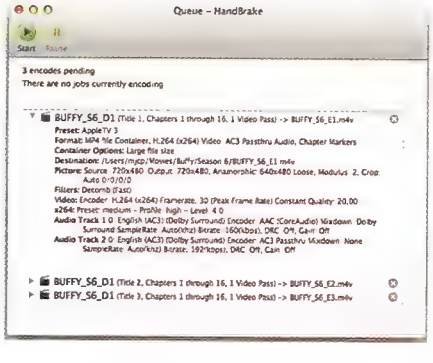
FIRST, GET THEM ON TO YOUR COMPUTER

The utility we'll be using is called Handbrake, which at time of writing is at version number 0.9.9 x86_64 and fairly stable under Mavericks. We haven't yet tested it with Yosemite. The great thing about Handbrake is that it is free and includes presets depending on what you want to do with your content, so you don't have to fiddle too much if you don't want to.

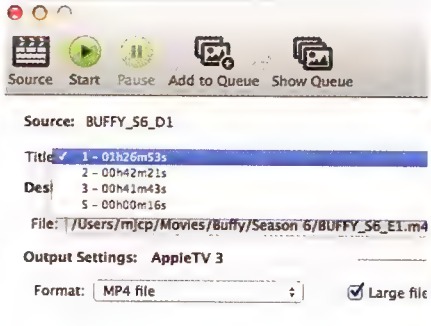
If you have discs from multiple regions, check out 'Freedom of Region' (right) before you continue. Handbrake is multi-region friendly, but you have to trick your Mac first.

When you put a disc in and fire up Handbrake, you then select the disc as the Source. Handbrake will then scan the disc (which can take a while) and present you with a range of options.

If the disc you're shifting has multiple titles on it – such as episodes of a TV show – click on the button next to 'Title:' to select which one you want to shift. Some of the things listed will be bonus features a few minutes long, but you should be able to guess from the running time which are the ones you want.


Queue – HandBrake
Start
Pause
3 encodes pending
There are no jobs currently encoding
BUFFY_S6_D1 (Title 1, Chapters 1 through 16, 1 Video Pass) -> BUFFY_S6_E1.m4v
Preset: AppleTV 3
Format: MP4 file Container, H.264 (x264) Video, AC3 Passthru Audio, Chapter Markers
Container Options: Large file size
Destination: /Users/mjcp/Movies/Buffy/Season 6/BUFFY_S6_E1.m4v
Picture: Source: 720x480, Output: 720x480, Anamorphic: 640x480 Loose, Modulus: 2, Crop: Auto 0/0/0/0
Filters: Decomb (Fast)
Video: Encoder: H.264 (x264) Framerate: 30 (Peak Frame Rate) Constant Quality: 20.00
x264: Preset: medium - Profile: high - Level: 4.0
Audio Track 1 0: English (AC3) (Dolby Surround) Encoder: AAC (CoreAudio) Mixdown: Dolby Surround SampleRate: Auto(xhz) Bitrate: 160(kbps), DRC: Off, Gain: Off
Audio Track 2 0: English (AC3) (Dolby Surround) Encoder: AC3 Passthru Mixdown: None SampleRate: Auto(xhz) Bitrate: 192(kbps), DRC: Off, Gain: Off
BUFFY_S6_D1 (Title 2, Chapters 1 through 16, 1 Video Pass) -> BUFFY_S6_E2.m4v
BUFFY_S6_D1 (Title 3, Chapters 1 through 16, 1 Video Pass) -> BUFFY_S6_E3.m4v

All queued up. You can check your settings before you hit Start.



Pick a title. On discs with multiple titles — like TV shows — it can be tricky to choose which is the video content you want.

Next, click on Toggle Presets in the upper-right corner of the Handbrake window. For our purposes we're copying some TV episodes to iTunes for sharing via AppleTV 3, but if you want smaller files you can carry on a space-limited iPhone or iPad, use those presets.

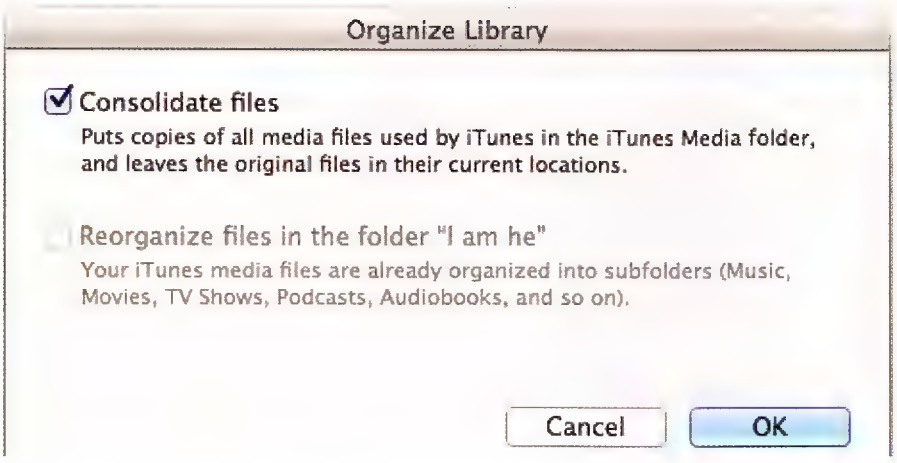
Next, click on 'Browse ...' to select where to save the resultant file. Where you place them initially doesn't really matter – we'll move them to iTunes afterwards. Be sure to give the file a unique name, and one that you'll remember.

Then add any subtitles or audio options you might want – AppleTV supports some advanced features, but if you want manageable file sizes keep it simple.

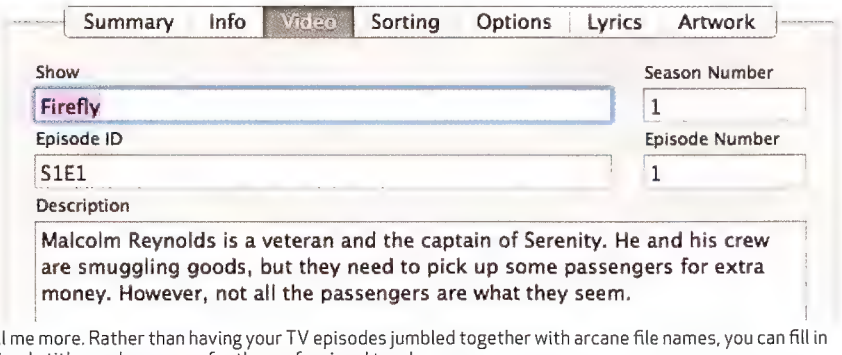
Finally, Click on 'Add To Queue'. This is useful for reviewing your settings before you commit to anything, but also handy if you're copying multiple titles off a single disc. Click on 'Show Queue' to see what you've got, and if everything is to your liking, click on Start. Now go have some tea.

NEXT, GET THEM TO ITUNES

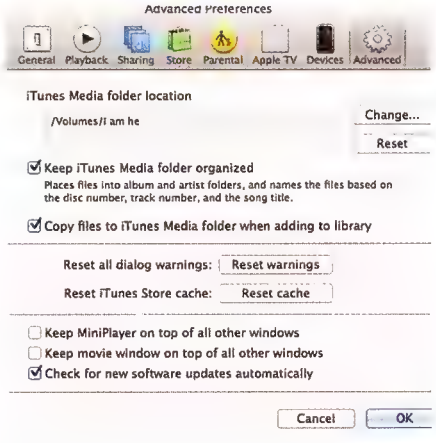
After a little while, you'll be left with some .m4v files in a folder on your hard drive. Getting them into iTunes is pretty straightforward: select them


Organize Library
Consolidate files
Puts copies of all media files used by iTunes in the iTunes Media folder, and leaves the original files in their current locations.
Reorganize files in the folder "I am he"
Your iTunes media files are already organized into subfolders (Music, Movies, TV Shows, Podcasts, Audiobooks, and so on).
Cancel
OK

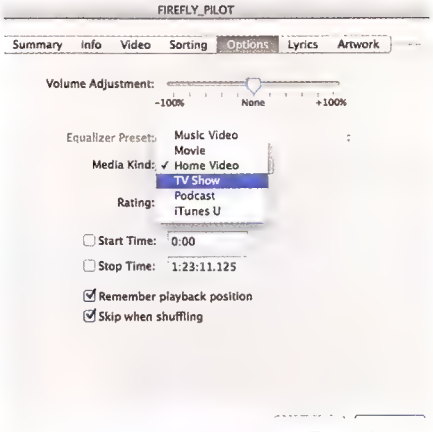
Put it together. After you drag the files over to iTunes, you should select 'File > Library > Organize Library' to copy the files from wherever Handbrake put them into your iTunes library.



Tell me more. Rather than having your TV episodes jumbled together with arcane file names, you can fill in episode titles and synopses for the professional touch.



Keep it together. If you've already told iTunes to copy media files across to your iTunes library when importing, you can delete the copies Handbrake made.



What am I? Every .m4v you import to iTunes shows up as a movie. If it's a TV show or something else, you'll have to tell iTunes so it shows up in the right place for you.

and drag them over. iTunes will recognise that they are video files from the extension, and you'll find them grouped amongst your Movies. If you've told iTunes to copy files to the media folder when importing, you can now delete them from wherever Handbrake saved them. Otherwise see the screenshot 'Put It Together' (above).

If the files you've shifted are actually movies, go to the next paragraph. If they're TV shows, select the filenames in iTunes, right-click and select Get Info. If you've selected multiple items, you'll get a warning about that – just click OK. Next, click on the Options tab and select 'TV Show' from the 'Media Type' menu. Click OK, and your file will move to the list of TV Shows in iTunes.

You may, if you wish, Get Info on your files again and click on the Video tab to fill in additional information including episode numbers and synopses if it's a TV show (to give individual episodes names as well as numbers, you use the Title field under the Info tab). Again, tragically, iTunes offers no way to automate this as it does for music. One day perhaps.

Freedom of Region

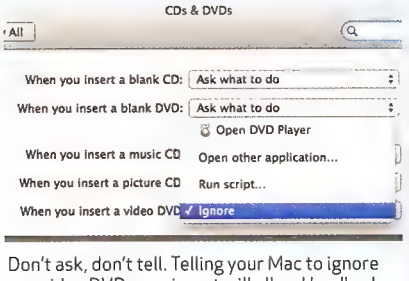
Region-coding is one of the stupidest and most futile uses to which technology has ever been put. These days manufacturers have more or less acknowledged defeat, and it's near impossible to find a set-top DVD player that won't play DVDs from multiple regions. Not so for computer DVD drives, which continue to enforce the rules. When you buy a new drive, it's region-free until you put a disc in — then you must set the drive's region to match that of the disc. Macs allow you to change this only five times, then they're locked down tight.

You can, in most cases, flash the firmware of your drive to reset the region coding — though this won't work in all cases and will void your warranty. Another way around is to buy a second external USB DVD drive. Leave the one in your Mac set to, say, Region 4 and the external to Region 1, and you ought to be able to rip the majority of the discs in your collection. Such drives can be had very cheaply.

There is a simple trick, though, that works for Handbrake with the majority of discs.

Open 'System Preferences' and click on the 'CDs & DVDs' pane. Click on the button next to 'When you insert a Video DVD:' and select Ignore from the menu. That will stop the OS from looking too closely at any DVDs you insert, and checking them for region codes. Since Handbrake asks the OS for the drive's region code, it will then work with the majority of discs from different regions.

Note that this will not work for disks using Region Code Enhancement (RCE) or other advanced tricks for enforcing region codes. Handbrake also won't bypass any copy-protection.



Don't ask, don't tell. Telling your Mac to ignore any video DVDs you insert will allow Handbrake to turn a blind eye to most region-coding.

With the AtHome app, you can turn an iPhone into a CCTV camera and monitor footage remotely.

Use an old iOS device as a security cam

Lou Hattersley shows you how to turn an old iPhone or iPod touch into a home surveillance system.

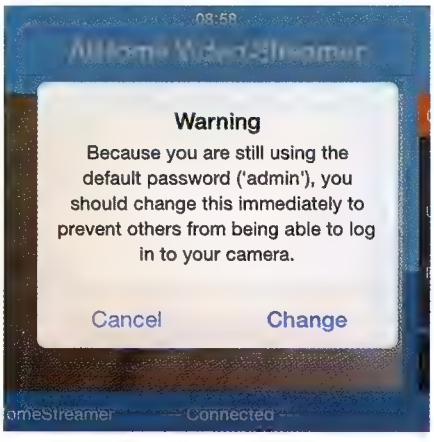
Setting up a home surveillance system can be an expensive affair, but a cunning alternative is to turn old iPhones and iPod touch devices into CCTV cameras. The iPhone is a terrific surveillance camera; it has a great lens, sensor, and networking built in.

There's an app for everything, so you won't be surprised to hear about a free app called AtHome Camera (**tinyurl.com/apc409athome**) that will help you out. Although you might not want to leave your iPhone outside, AtHome Camera gives you the go-ahead to monitor what's going on in different rooms around the house.

It even lets you listen in to what other people are saying, or you can talk to people remotely!

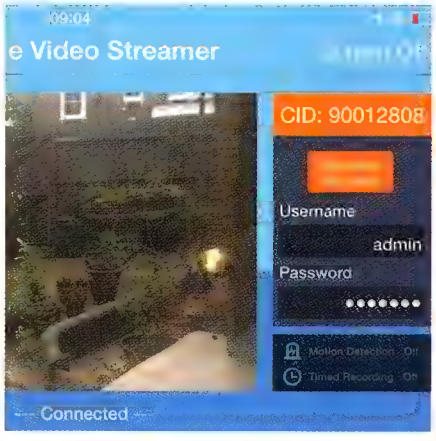
Here we'll use an iPhone as the camera, which we'll view from an iPad, but of course you can use any compatible iOS device for either task.

Set up your iPhone as an IP camera


Warning
Because you are still using the default password ('admin'), you should change this immediately to prevent others from being able to log in to your camera.
Cancel
Change
Connected

1 VIDEO STREAMER

Open the App Store on the device that you want to use as a surveillance camera (typically an old iPhone or iPod touch). Now search for the AtHome Video Streamer app (not the AtHome Camera app). Install then launch the app and an alert requests microphone access — tap OK. Next you are prompted to change your password: tap Change and choose a new short password. This password enables the iPad to access the iPhone camera securely.

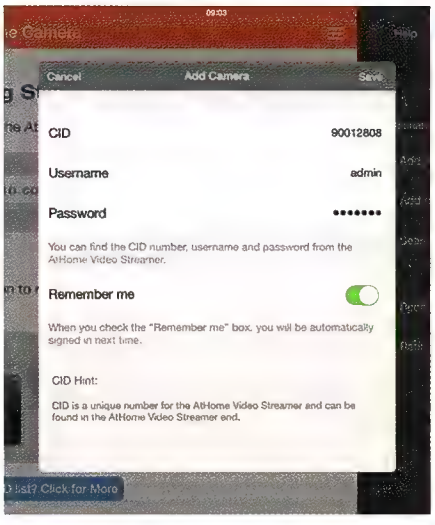


2 SET UP THE IPHONE

Place the iPhone horizontally, so it's looking at the surveillance area. Note the CID (Connection ID): this is an eight-digit number displayed in an orange box on the right of the AtHome Video Streamer app. You need this number to connect the iPad app to the iPhone app. Make sure the iPhone has enough charge, or is plugged in, because recording drains the battery rapidly; you can tap the Screen Off icon to consume less energy.

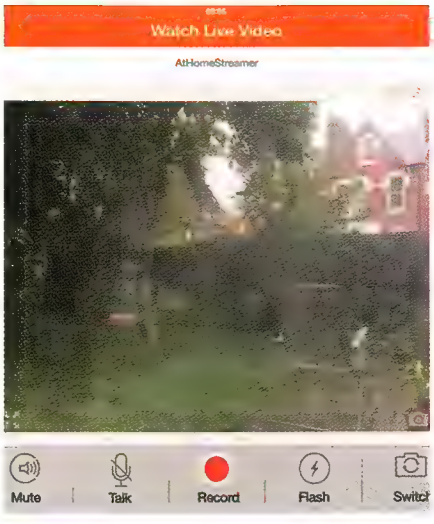
3 ATHOME VIDEO CAMERA

Now open the App Store on your iPad and search for an app called AtHome Camera Free. This separate app connects to the AtHome Video Streamer app running on the iPhone. When you first open the AtHome Video Camera you are asked to log in with your AtHome account and Password (this is not the same password as you created in Step 1). Click Create Account, enter your email and a password, and tap Create Account.


Cancel
Add Camera
Save
CID
90012808
Username
admin
Password
•••••••
You can find the CID number, username and password from the AtHome Video Streamer.
Remember me
When you check the "Remember me" box, you will be automatically signed in next time.
CID Hint:
CID is a unique number for the AtHome Video Streamer and can be found in the AtHome Video Streamer end.

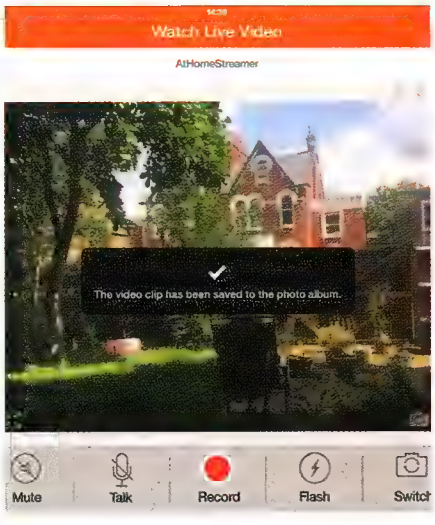
4 CONNECT THE TWO

Now that you have both AtHome apps installed on the iPhone and iPad, it's time to connect the two. Switch to the AtHome Camera app on the iPad and tap the Menu icon in the top right. Now tap 'Add by CID' and enter the eight-digit CID number displayed on the iPhone. Enter `admin` into the Username field and the password you picked in Step 1 into the password field. Now tap the Save icon (located in the upper right of the Add Camera window).



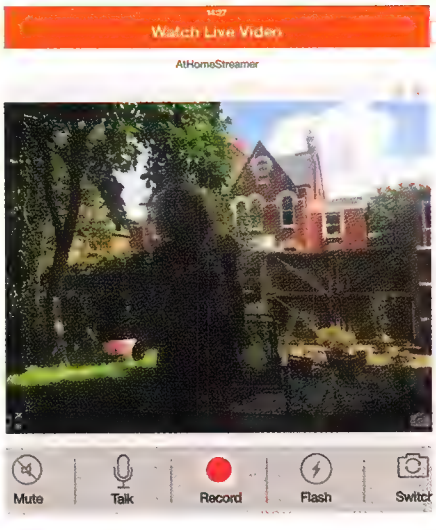
5 WATCH THE VIDEO

The iPhone should now appear with the title AtHomeStreamer in the main window on your iPad. Below it is a green button and the word Online. Tap it to connect the iPad to the iPhone and start watching the remote video feed. The feed is live and in real time (although there will be a small delay depending on your connection). You should also be able to hear sound captured from the iPhone's built-in microphone through the iPad.



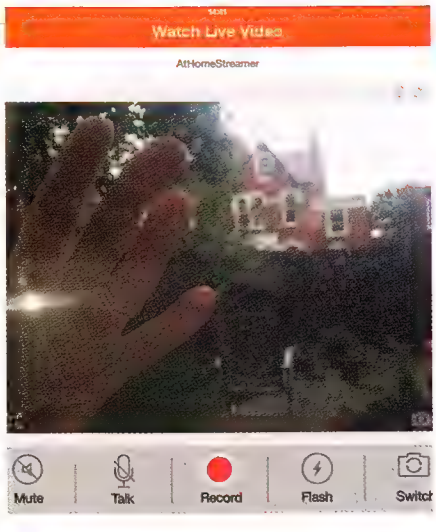
6 CAMERAS AND RECORDING

You can use the Switch button to flip between the iPhone's iSight and FaceTime cameras to record in both directions. If you see something you want to save, tap the red Record button to start recording the action. Tap the Record button again to stop capturing video, and the AtHome Camera app displays "The video clip has been saved to the photo album." Tap on Photos > Albums > AtHomeCam to view the video clips afterwards.



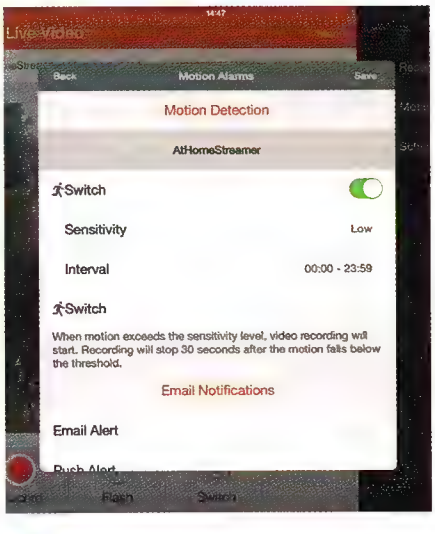
7 TALK AND MUTE

By default you hear all the audio from the iPhone's built in microphone. You can silence the iPhone by tapping the Mute icon in the app on the iPad. You can also remotely speak through the iPhone by tapping the Talk icon: the line through the icon is removed, and now you can talk into the AtHome Camera app on your iPad, with the audio coming out of the iPhone. Tap Mute and Talk again to toggle the audio functions to suit you.



8 FLASH AND PHOTO

If the scene is dark and you want to light it up, tap the flash icon in the AtHome Camera app. This option activates the LED flash on compatible iPhones to light up the scene. You can also take photographs by tapping the Camera icon at the bottom right of the video screen. These are also saved to the AtHomeCam album in the Photos app. You can switch to full-screen mode by tapping the full-screen icon at the bottom-left of the video display.



9 SET UP MOTION ALARMS

Once you are happy with the AtHome Camera setup you can set motion alarms. These send you notifications when the app notices any movement. Tap Menu > Motion Alarms and set the switch option to On. Now choose a sensitivity and interval, then tap save and save again to turn on the alarm. Now when anything moves in front of the iPhone you get an alert to watch the action on your iPad. Tap quit if you want to disconnect from the iPhone.

Determine where to store data for your macros

Helen Bradley explains some of the issues which you face using predetermined data in your macros.

Listboxes are a great way to enter data into a worksheet because they are simple for your user to use and they let you determine ahead of time what data the user can choose from. However, when you are providing data that the user can choose from you need to put that data where it can be easily accessed and, if necessary, easily updated. This month we'll look at three options for populating a listbox with data and why you might use each of them in turn.

EMBED THE DATA IN YOUR CODE

One option for providing data to a user via a listbox is to put that data in the macro code itself. In this way the data will travel with the macro so it will be available to any worksheet at any time. On the flip side, putting data in the macro will make it difficult to change and update – because to do so you would need to edit the macro code – which requires some level or knowledge to do. It isn't always advisable to encourage regular users to mess with your code.

STORE DATA ON A SHEET

You can also populate a listbox from data in a worksheet. This is useful in that, if you use a named range, you (or the user) can add data to that range more easily than editing actual macro code.

> "When you are providing data that the user can choose from you need to put that data where it can be easily accessed."

However, this solution will be limited to a macro that is attached to and designed to run on a single worksheet and not one that is available to all worksheets because of the need to have the data available on an open sheet.

POPULATE AT RUN TIME FROM A FILE

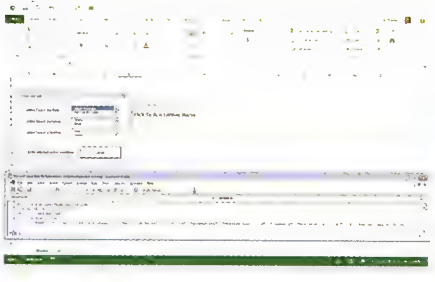
Our final solution is to populate the listbox with data from a text file stored on disk. A user can open the text file in any text editor and add to or remove data from it as required. This removes the data from the worksheet so the data is more easily edited and the solution won't be tied to a specific workbook. Of course, the file needs to be stored in the correct location and your code needs to be written so it opens the file from the user's folder on disk. ■

Get it

Download the macro code you need for this article from **www.apcmag.com/magstuff.htm.**

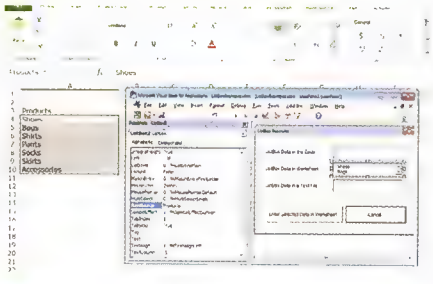
Three options

Choose the best location for your data set.



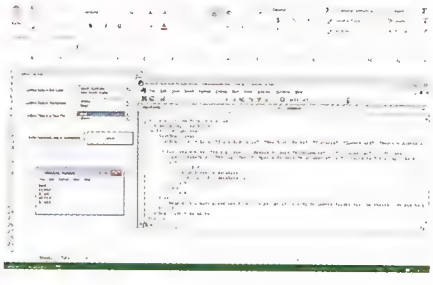
1 STATIC DATA

One way to populate a listbox is with data you add to it at run time in your code. Here Listbox1 is populated with Australian states which is data that won't change and which won't require editing in future.



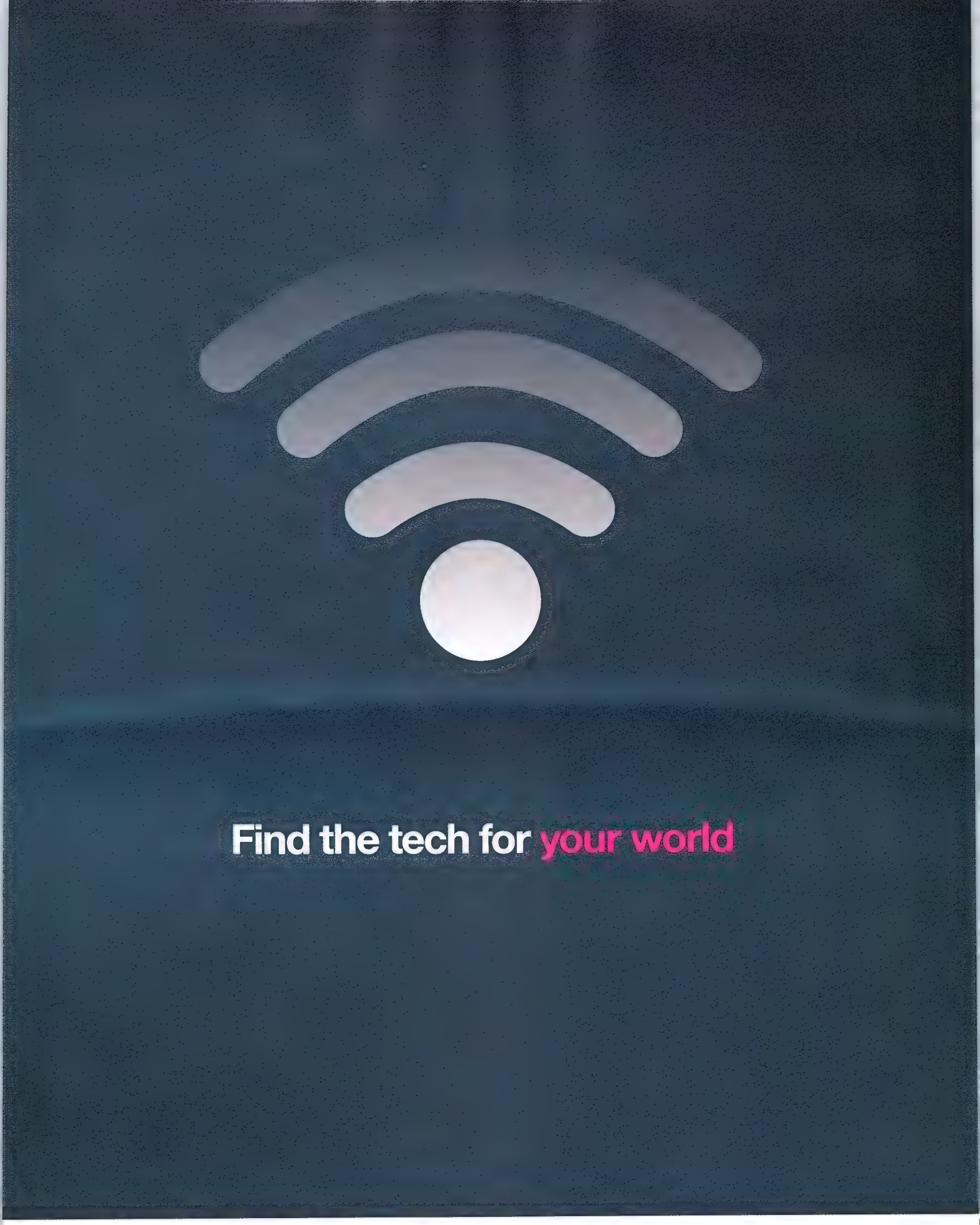
2 WITHIN A SHEET

Here Listbox2 is populated with data stored in a sheet called Data, in a named range called Products. This option is appropriate for use in a macro which is attached to a particular worksheet.



3 LOCAL FILE

Listbox3 is populated with data stored in a text file called colours.txt stored in the current user's My Documents folder. The .txt file can be easily edited by the user. ■



techradar.

TECHNOLOGY, TESTED

PARTS		
	PART	PRICE
CASE	SILVERSTONE DS380	$169
PSU	SILVERSTONE ST45SF-G 450W	$115
MOBO	ASUS ROG MAXIMUS VII IMPACT	$319
CPU	INTEL CORE I7-4790K	$399
GPU	NVIDIA GEFORCE GTX 780	$669
RAM	2X 8GB CORSAIR DOMINATOR PLATINUM	$290
HDD	3X 6TB HGST ULTRASTAR HE6	$2,370
SSD	1TB SAMSUNG 850 PRO	$729
CABLE KIT	SILVERSTONE PP05-E	$35
OS	WINDOWS 8.1 PRO	$135
TOTAL		$5,230

Big capacity, small box

Can Tom McNamara combine compact size, high performance, and loads of storage? He'll give it a shot

If you couldn't tell by now, we're performance junkies here at APC. Just three months ago, we were crazy enough to build a $30,000 liquid-cooled computer with two PCs inside it. But you can't drive in the fast lane all of the time. Sometimes it's better to take a quiet Sunday drive down to the park and have a picnic. That doesn't mean the meal has to be bland, but we will be shifting gears for a new palate (with a side of mixed metaphors).

This month, instead of building for just speed, we're also building for capacity. But that's a pretty straightforward challenge; anyone can slap a bunch of hard drives in a case and call it a day. We're going to up the ante by shoving eight hard drives into a mini-ITX case. At least, that was the original plan before motherboard maladies intruded. Whatever, we like having massive storage options in addition to our turbo-charged gaming PC or A/V production workstation. This way, we can create a library of full-system backups, and stream media to devices, in a discreet and portable form factor.

If you want to cram a large number of drives into a mini-ITX system, special gear is required. We were originally going to go with the Asrock C2550D4I, which has 12 SATA ports and an integrated low-power Avoton quad-core CPU, and support for ECC RAM. Unfortunately, we discovered it's quite finicky about what RAM it will accept, and appears to strictly adhere to modules on the qualified vendor list. After many failed boot attempts and different slot configs and half a dozen DIMMs, we had to give up. It's not just us either, the internet is rife with people reporting similar problems.

So, we had to switch to Plan B: a conventional Intel Z97 motherboard and Haswell CPU. This cuts our maximum drive count to four, but we could always install a RAID card in the PCIe slot to add more if we wanted. You can also remove a part of the 3.5-inch drive cage to make room for a long card, though this does sacrifice one drive tray.

But what kind of mini-ITX case could even hold eight 3.5-inch drives? Enter the SilverStone DS380, whose entire front is a series of drive bays measuring about 11-inches tall. It's also over 8-inches wide, giving us room for a variety of activities. This case also takes SFF (small form factor) power supplies, and we went with the SilverStone ST45SF-G, a bronze-rated unit pumping out up to 450 watts.

STEP ON BOARD

Our replacement motherboard is the

ASUS ROG Maximus VII Impact. Compared to Plan A, this one has a full x16 slot, USB 3.0, shielded integrated sound, dual-band 802.11ac, and of course, a spot to install a Haswell CPU. (We went with an unlocked model because we didn't have the locked version handy and this board with a locked CPU would be a crime.) You have to install a couple of modules on the board such as the Wi-Fi.

Our max RAM capacity is reduced to 32GB, and we lose eight SATA ports and one fan header. You can install a RAID card to add more SATA ports, instead of the video card, but we wanted a hybrid build. By way of compromise, we slapped in three 6TB hard drives and one high-powered 1TB solid-state drive.

GETTING CAGEY

This is a compact case, so we need to temporarily remove both drive cages to give the board enough clearance for installation. The main drive cage in the front is secured with four small black screws on the side, and two chromed screws underneath the case. Once those are removed, you can slide the drive cage toward the rear, and lift it right out. Then, the 2.5-inch drive cage at the top of the case comes out.

The motherboard has a vertical extension that holds additional voltage regulators, which is attached via two screws. Remove these, line the board's four corner holes up with the pre-installed standoffs in the case, and screw in the board.

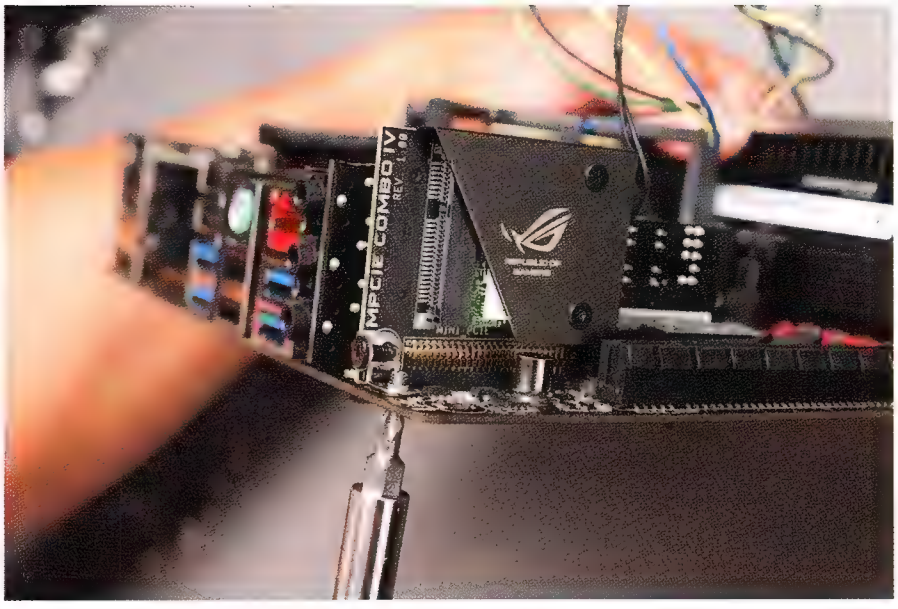
ALL WIRED UP

With the board installed, we can begin hooking it up. We attach all four SATA cables now, since they're easy to reach with the drive cage removed. The Impact's audio comes in though a daughterboard. We plug that in, screw it down, and connect the front-panel audio cable to it. There's an additional mini-card to add two fan headers, and another for Wi-Fi. The I/O shield has perforated holes that you tap out and send the Wi-Fi connectors through.

BY THE POWER SUPPLY OF GREYSKULL

Since we have the case open, now is a good time to install the power supply. It goes in the top, and there's an intake grill right there for the PSU to get cool exterior air. We take the flat-cable kit and connect the motherboard power, CPU power, SATA power, and Molex. Our hard drives will be getting their power from the PSU's Molex cables; both of them plug into the drive cage's backplane and provide all the juice needed there. We'd never find an SFF PSU with eight SATA connectors anyway (this one has two).

The motherboard power cable is a bit tricky to plug into the board because it's nearly flush with the bottom of the case, but we managed to wiggle it in after a few tries. The CPU cable also has one end specifically for the PSU and another for the mobo.



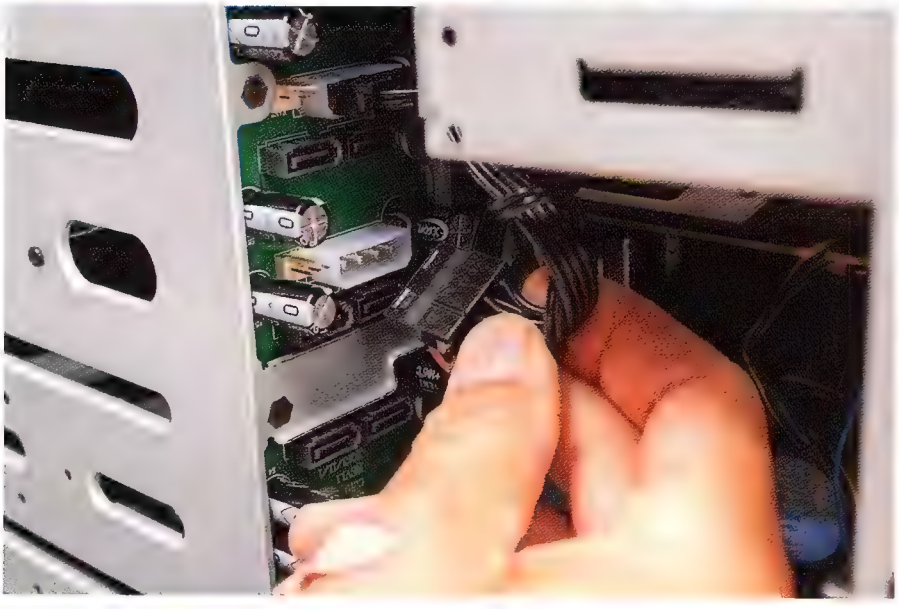
"By way of compromise, we slapped in three 6TB hard drives and one high-powered 1TB solid-state drive."

PIECING IT TOGETHER

With the motherboard hooked up, we can drop the drive cages back in. Note that the backplane of the 3.5-inch cage has two data connectors per drive. One is actually for dual-channel SAS drives, while the other is for SATA or single-channel SAS. (They're clearly labelled to avoid confusion).

We take the other ends of those SATA cables we plugged into the motherboard earlier, and we attach them to the SATA side of the backplane, one by one. Then we put the cage's screws back in and unlock the door, which uses a five-sided bit as a key. With the door open, the drive trays slide out from the front. Since the backplane has integrated SATA/SAS connectors, you just put the drive into the tray, attach a few screws, and slide the tray back in. The drive is now installed.

Although we can't populate the whole cage with drives, three 6TB units give us 18TB, which is a very good start. Plus there's the 1TB on the SSD, which we're using to boot Windows. If only we had 10TB drives!



IN PLANE SIGHT

Since the SATA ports on the board are close to the backplane, we can tuck most of the cabling behind the cage. All three fans have twist ties pre-attached, so need minimal adjustment. The rear fan cable is a bit tricky, though. Its cable is not sheathed, so the wires are easily snagged. You can tuck away the wires, as there isn't a fan header particularly close by. You also want to keep it well clear of the CPU's heatsink, to keep the wire insulation intact. We ended up stringing it along the bottom of the case. Not pretty, but it gets the job done.

The other cables are mostly hidden by the sheer bulk of the 3.5-inch drive cage (which would weigh over 6kg after populating all eight trays). This is not a flashy case with a side window, but you're unlikely to be fiddling with its innards often, so appearance is not a high priority.

A HIGH PRICE AND MIXED RESULTS

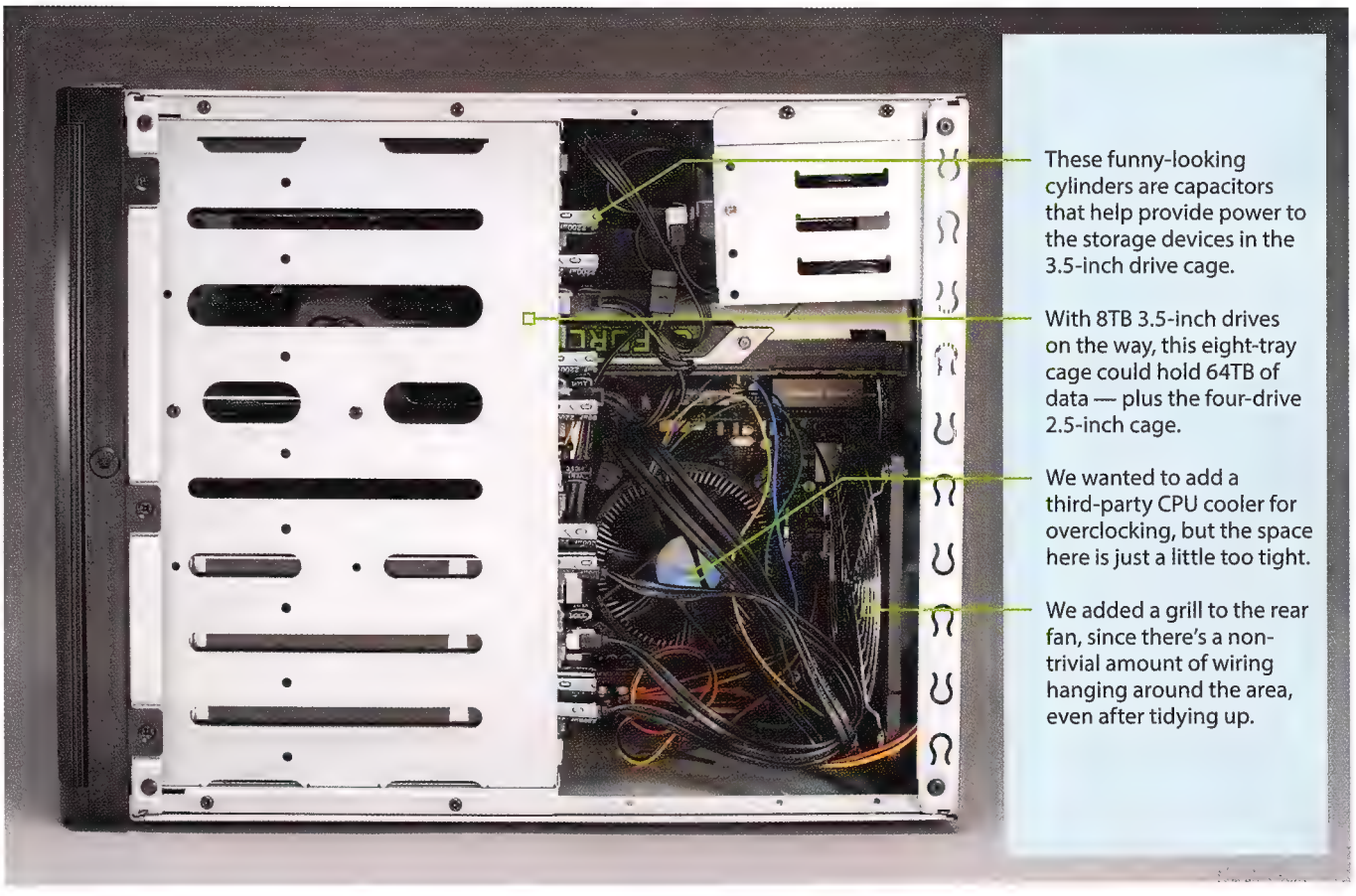
Ironically, we started with the Asrock C2550D4I because we wanted a more straightforward build. With an integrated CPU and cooler, it cut down on the steps we needed, giving us more time to fiddle with Ubuntu (the CPU on the original board doesn't support desktop versions of Windows, and we couldn't justify $700 Server 2012).

As far as we can tell, the C2550D4I is picky as hell with RAM. Asrock has a very short QVL list for RAM and many of them aren't sold locally. After burning hours trying to get the board to POST with a fistful of different modules in every possible configuration, we gave up. But rather than completely bail, we decided to make something of the system, especially since we had some nice hardware waiting in the wings.

Almost no video card would be possible without the removable section on the 3.5-inch drive cage. Not even that shorty Nvidia GeForce GTX 760 that we used in one of the *Minecraft* builds recently. Even then, the dimensions of the cut-out clearly limit you to a reference-sized card – we ended up with only a few millimeters between the card and the edges of the cage. Luckily, we have several reference units lying around (and we made sure we chose one you could still buy).

PROBLEM FANS

The other half of the equation was SilverStone's cable kit, which is short and flexible. At $35, it's not a cheap kit, but with over $5,200 already invested, it's a relatively small expense. You could try using your own cable set, but, for safety reasons, we don't recommend it. Each power supply's set of cabling is

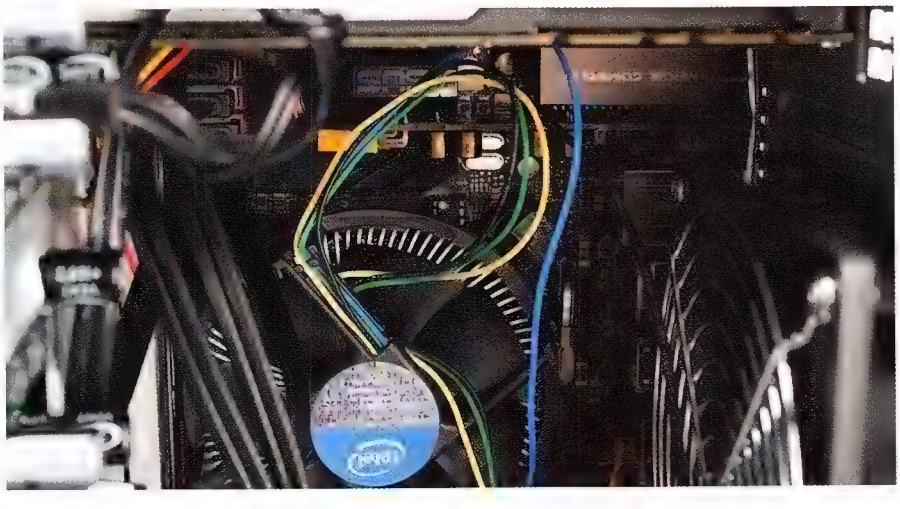


These funny-looking cylinders are capacitors that help provide power to the storage devices in the 3.5-inch drive cage.

With 8TB 3.5-inch drives on the way, this eight-tray cage could hold 64TB of data — plus the four-drive 2.5-inch cage.

We wanted to add a third-party CPU cooler for overclocking, but the space here is just a little too tight.

We added a grill to the rear fan, since there's a non-trivial amount of wiring hanging around the area, even after tidying up.



designed for a specific range of tolerances. Our original power supply was 300 watts and had integrated cables, but only one PCIe connector. We needed two for the GTX 780.

We almost fit a Cooler Master 212 EVO on top of the CPU, but the capacitors on the drive cage's backplane poke into that space. Putting the fan on the other side of the radiator fin stack would also compel us to reverse the airflow of the rear exhaust fan, or else the rear exhaust and CPU fan would be fighting over the air coming their way. There would be no proper exhaust for the case, and heat would build up. We could've experimented with a 120mm closed-loop water cooler, but the build was already in overtime.

We'd consider this build a qualified success but we honestly don't recommend anyone follow our blueprint. It would have been cool to slap a load of high-capacity drives in there and see what the Asrock CPU-plus-mobo combo could handle. At $280, the C2550D4I would also have been considerably cheaper. On the bright side, we get more adaptability with the higher cost and desktop OS driver support. But our price tag is on the high side. You'd probably be fine with an Intel Core i5 CPU, $125-ish mobo, 8GB of RAM, and 250GB SSD. That slashes about $1,000 off the build. Then you can go with much less expensive 4TB or 3TB drives. But like we said, why let the fancy toys collect dust?

SUBSCRIBE TO *APC* NOW AND GET SIX ISSUES FOR ONLY $40!

12 ISSUES FOR ONLY $69

WHY SUBSCRIBE?

- Take advantage of our new subscription offer of six issues for $40 if you choose to auto-renew*
- Or get 12 issues of Australia's favourite tech mag for only $69!
- Save even more, with 24 issues for $128. That's only $5.30 per issue!
- Free delivery of every issue straight to your door
- Free disc with exclusive software in every issue

SAVE UP TO $110!

FREE DISC
CREATE YOUR OWN DESKTOP GADGETS & MINI APPS, TUNE UP & OPTIMISE YOUR PC
+ MAKE WINDOWS BOOT FASTER WITH THESE FULL-VERSION PROGRAMS
WINDOWS 10
apc
Dec 2014 Issue 409
YOUR EXPERT GUIDE TO TODAY'S TECH
REVEALED!
A CHROMEBOOK FOR CHRISTMAS?
HAVE GOOGLE'S BUDGET LAPTOPS AND DESKTOPS FINALLY COME OF AGE?
ENTHUSIAST X99 'BOARDS ON TEST
BUILD A BLISTERING RIG WITH INTEL'S LATEST HIGH-PERFORMANCE KIT
THE REAL THREATS REVEALED
12 SECURITY SUITES COMPARED
SHIELD YOUR ANDROID
MAC & iOS SECURITY SECRETS
TAKE BACK YOUR
PRIVACY & SECURITY
RAMP UP YOUR DIGITAL DEFENCES WITH OUR COMPLETE GUIDE TO ONLINE SECURITY, PRIVACY & ANONYMITY
HOLIDAY HOW-TOs!
HOT NEW GEAR

FREE DELIVERY TO YOUR HOME OR OFFICE EACH MONTH

HURRY

OFFER ENDS DEC 10, 2014!

TWO EASY WAYS TO SUBSCRIBE TO *APC* MAGAZINE

VISIT www.magshop.com.au/future

OR

CALL 13 61 16 and quote M1412APC

TERMS & CONDITIONS This offer expires December 10, 2014, and is available to subscribers within Australia only. Please allow 6-8 weeks for delivery of your first issue. For full terms and conditions, see www.magshop.com.au/future. Please see our privacy policy on page 3. *6 issues for $40, then $40 charged to your credit or debit card every 6 issues thereafter on auto-renewal.

Jaycar Electronics

Better. More Technical

Find Your Nearest Jaycar Store Here

Scan the QR code with your phone

Your One-Stop-Shop for Arduino compatible products & accessories.

Here is your NEXT PROJECT! **NEW ARRIVALS!** **Arduino Board, Shields, Sensors & More!**

OLED STICK

Use the OLED Stick to combine the tiny LeoStick Arduino-compatible board (XC-4266) with the 128x128 pixel OLED module (XC-4270) to create your own project with an amazing graphic display.

NEW! $12.95

- Breakouts for all LeoStick I/O pins

XC-4245

Note: OLED module (XC-4270) and LeoStick (XC-4266) sold separately, see bottom of page

OLED SHIELD

Connect the 128x128 pixel OLED module (XC-4270) to your Arduino using this handy shield, which also provides joystick input and a Piezo module for sound output. Display menus on the screen, use the joystick for selection, and give audible feedback.

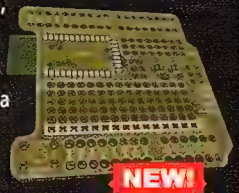
- Analogue joystick with push-to-click, great for games or on-screen menus

NEW! $29.95

XC-4269

BLUETOOTH® SHIELD

Connect your Arduino via Bluetooth® wireless technology for over-the-air reporting, control, and software updates. You can link multiple Arduinos together via Bluetooth®, with one acting as a master and the other as a slave. Pair it with your mobile phone to create a wireless sensor or control device.



- Onboard antenna
- Up to 10 metre range

NEW! $39.95

XC-4259

DUAL CHANNEL INFRARED REFLECTANCE SENSOR

A pair of infrared reflectance sensors mounted on one PCB, spaced just the right distance apart to build a line following robot. Easy interface with Arduino. Symmetrical PCB with snapoff holes across the middle, so you can use it as a pair or cut/snap it in half to have two separate reflectance sensors.

- Analogue output shows light or dark surface detected

NEW! $12.95

XC-4261

BAROMETRIC PRESSURE SENSOR

Highly sensitive barometric pressure sensor for weather, industrial, rocketry, balloon, and many pressure applications. Designed specifically for use as a microaltimeter so it has incredible resolution: so sensitive it can detect an altitude change of just 130mm!

- Operating pressure range 10 to 2000mBar
- I2C interface for easy Arduino connection

NEW! $29.95

XC-4255

ARDUINO BOOKS

Detailed, practical and plenty of projects, for first timers or experts. See website for more information.

Programming Arduino: Getting Started with Sketches	BM-7133	$17.95
Getting Started with Arduino - 2nd Edition	BM-7131	$23.95
Arduino + Android Projects for the Evil Genius	BM-7135	$34.95
30 Arduino Projects for the Evil Genius	BM-7134	$34.95
Arduino Robot Builder's Bonanza	BM-7136	$36.95
Practical Arduino	BM-7132	$44.95

WATCHDOG TIMER MODULE

This handy module connects to your Arduino or other microcontroller project and makes sure it's still running by watching for a "heartbeat" signal. If the signal stops, the watchdog uses the microcontroller reset line to kick it back into life. Ideal for projects that are mounted in hard-to-reach places and need to keep running with long term reliability. Selectable 5 minute or 1 minute timeout interval.

- Status LEDs on input and output for visual feedback

NEW! $14.95

XC-4267

9 DEGREES OF FREENDOM INERTIAL MEASUREMENT UNIT

Combining an accelerometer, a magnetometer, and a gyroscope all in one tiny package with an Arduino friendly I2C interface. Perfect for building an autopilot for a quadcopter, or tracking the position of a robot, or logging data in a rocket. Combine three axis data from each of the sensors for a total of 9 degrees-of-freedom (DOF) of tracking.

- Programmable "interrupt" output

NEW! $69.95

XC-4265

7200+ PRODUCTS
548 PAGES
CATALOGUE

$4.95

Wide range of accessories also available including multimeters, headers, breadboards, leads, enclosures, Arduino books, etc. More details on our website.

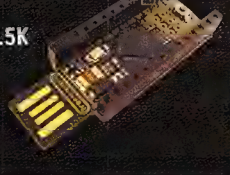
ARDUINO ESSENTIALS

VISIT OUR WEBSITE OR ONE OF OUR MANY STORES TO EXPLORE THE HUGE RANGE

LEOSTICK

A tiny Arduino-compatible board that's so small you can plug it straight into your USB port without requiring a cable! Features a full range of analogue and digital I/O, a user-controllable RGB LED on the board and an onboard Piezo/sound generator.

$29.95

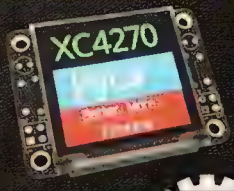


- ATmega32u4 MCU with 2.5K RAM and 32K Flash
- Size: 49(W) x 19(H) x 8(D)mm

XC-4266

128X128 PIXEL OLED DISPLAY MODULE

High resolution, full colour 128x128 pixel OLED module perfect for your display needs including graphics, gauges, graphs and interactive displays.



- 16,384 full colour RGB pixels
- 28.8 x 26.8mm active display area
- Size: 44(W) x 36(H) x 5(D)mm

$49.95

XC-4270

ARDUINO EXPERIMENTER'S KIT

Everything you need to get started with the exciting new world of Arduino. Kit includes "Eleven" Arduino compatible board, servo motor, lights, switches, breadboard and more. Complete with instructions, a supporting web page and software examples.

- No soldering required

$89.95

XC-4262

FREE CALL ORDER **1800 022 888** WEBSITE **www.jaycar.com.au** Prices valid to 10/12/14

Arduino Basics #2 – Measuring temperature and humidity

In the second part of this new series, Darren Yates shows you a quick way to add environmental sensing to your projects.

Being able to sense the physical environment around your Arduino can be the source of lots of great project ideas. Last time, we looked at how to measure distances using an ultrasonic sensor and this month, we'll look at how to use a temperature and humidity sensor. We're using a low-cost option that's easy to plug in and can be the basis of a range of projects including as an auto-activated fan, a weatherstation or an automatic garden watering system.

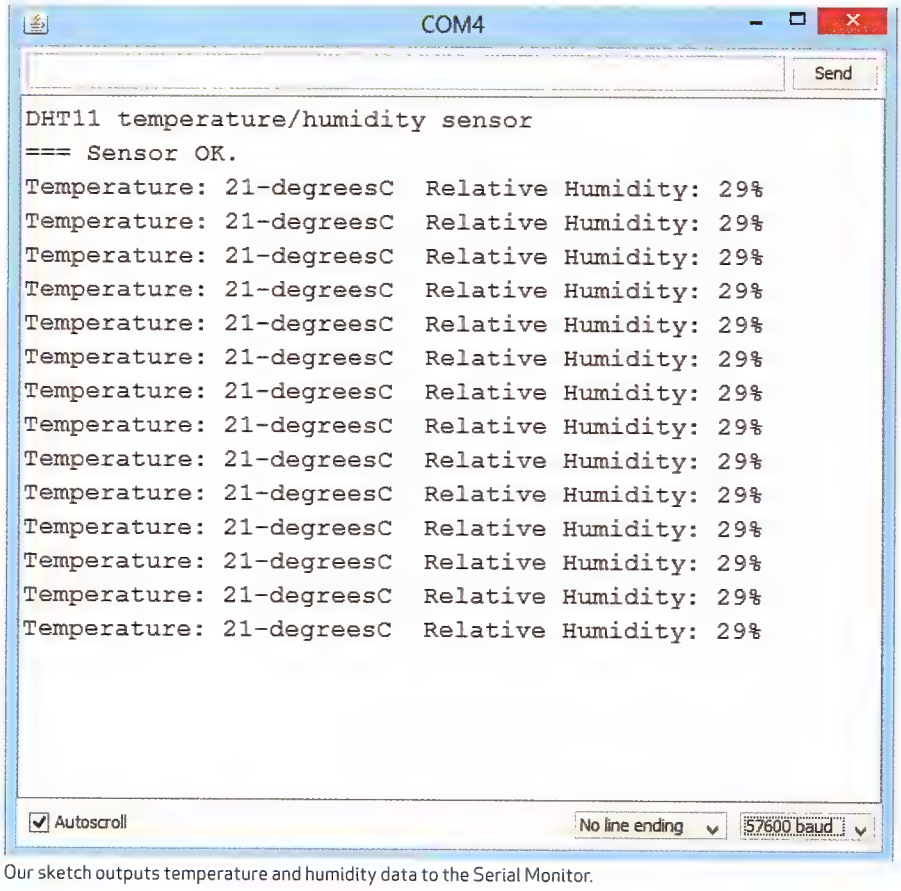
HOW THEY WORK

The sensor is a simple four-pin block that not only contains temperature and humidity measuring elements, but also a simple microcontroller chip that feeds out the data onto one of sensor pins, which we can read using an Arduino Uno or Freetronics Eleven board. There are two versions of these on the market – the blue DHT11 and the white DHT22. The DHT22 has higher accuracy, the DHT11 is cheaper – we'll be using the DHT11 but they essentially work the same way (we'll point out the differences as we go).

The DHT11 has four pins and you must connect it the right way, otherwise you'll blow it up – but don't worry, it's easy to work out. With the DHT11 label facing away from you, pin 1 is on the left, pin 4 on the right. Pin 1 is Vcc (or 5V power), pin 2 is 'data', pin 3 is not connected (N/C) and pin 4 is ground (GND, or 0V). Some sensor 'modules' on the market drop pin 3 altogether.

QUICK CONNECT

But we're going to use the cheat's way of connecting it to our Arduino board – this technique won't work with every device, but it works here and we'll explain why. The DHT11 is a very low-power device – it consumes no more than 2.5-milliamps (2.5mA) of current. The digital I/O (input/output) ports of an Arduino can supply up to 40mA, so if we set the Arduino's D3 pin high (that is, to 5V) and the D6 pin to GND (0V), we can power a device between those two pins, up to 40mA. We've just said the DHT11 only needs 2.5mA, so the D3/D6 pins are more than capable of powering our sensor.


COM4
Send
DHT11 temperature/humidity sensor
=== Sensor OK.
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Temperature: 21-degreesC Relative Humidity: 29%
Autoscroll
No line ending
57600 baud
Our sketch outputs temperature and humidity data to the Serial Monitor.

The DHT11 can measure temperature from 0 to 50°C and 20-90% relative humidity (the DHT22, also called the AM2302, can go from -40 to 80°C and 0-100% relative humidity). But to read the data from sensor's Pin 2, we need to apply a five-kiloohm (5k$^{\Omega}$) resistor connecting that pin to the 5V supply line or 'rail' – in this instance, it's called a 'pull-up resistor' because it's 'pulling up' the sensor's Pin 2 to the supply rail.

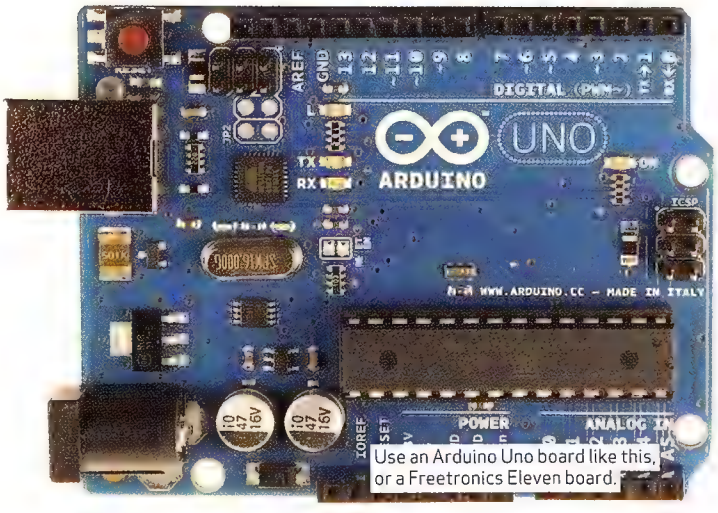
But this is where we'll use another hidden trick – the Arduino Uno's I/O pins all have built-in pull-up resistors and we activate the one on Pin D4 using one line of code:

```
pinMode(4, INPUT_PULLUP);
```

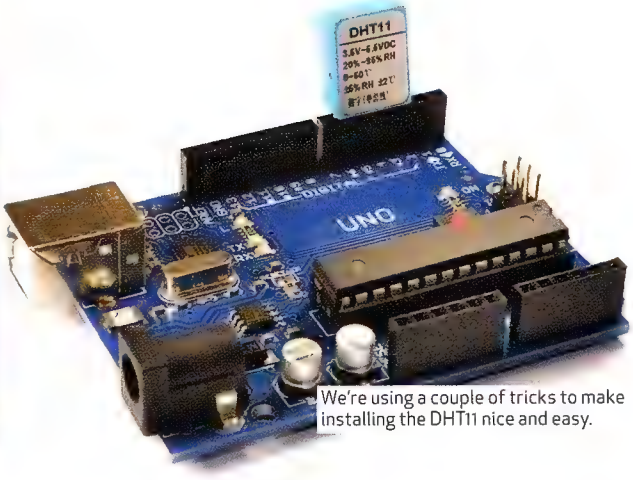
That tells the Arduino we want Pin D4 as an input (so we can read data from the sensor) and to activate its internal pull-up resistor. Pretty sneaky, huh? The upshot of all this is we've made it incredibly easy to install the DHT11 into the Arduino – all we need to do is just plug it in! With the DHT11 label facing in, it plugs into pins D3 to D6.

SOFTWARE SKETCH

That's the hardware done, now for the software! You'll need the Arduino integrated development environment



Use an Arduino Uno board like this, or a Freetronics Eleven board.



We're using a couple of tricks to make installing the DHT11 nice and easy.

(IDE), which you can download free from **arduino.cc/en/main/software**. For an Arduino Uno/Freetronics Eleven board, you just need the latest version 1.0.6. Next, grab the zip file from our webpage at **www.apcmag.com/magstuff**. Download it, unzip it and copy the contents of the libraries subfolder into the libraries folder of the Arduino IDE. Restart the IDE and load in the ab02_temphumid_v1.ino sketch file. Remove the DHT11 sensor if you have it plugged into the Arduino board, then plug the board into your computer via the USB cable. (If using a Freetronics Eleven board, get the driver software first from **tinyurl.com/elevenusb**.)

In the IDE menu, select 'Tools > Board', choose 'Arduino Uno', then select Tools again, but this time, go 'Serial Port' and select the COM port for your board (it won't likely be COM1 – that's usually your mouse!).

FLASHING YOUR ARDUINO

When that's done, click on the right arrow icon, second from the left and the code will be compiled and flashed to your Arduino board. When you get the 'upload completed' sign in the bottom status window, unplug the Arduino board, plug in the DHT11 sensor into pins D3 to D6 with the label facing in. Plug the USB cable back in, check that the COM port is still selected, then press the Serial Monitor icon on the top right of the IDE – this will launch the Serial Monitor window. On the bottom right of the new window, make sure the baud rate is set to '57600'. Your Arduino board will automatically restart and within a second or two, you should start seeing output. If you see '=== sensor ok' and readings appear, congrats – you're up and running!

HOW ARDUINO CODE WORKS

We talked about this last month, but remember, an Arduino 'sketch' code has to have a minimum of two main code sections or 'methods' – setup() and loop(). The setup() method runs first and runs once; the loop() method takes over and loops continuously happily ever after (or until power is removed).

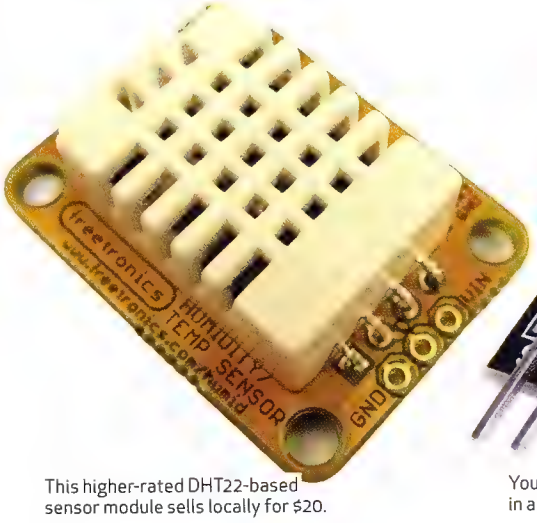
DHTLIB LIBRARY

We're standing on the shoulders of those who've gone before us by using the DHTLIB code library by Rob Tillaart (that's what you've copied to your libraries subfolder). It makes coding the sensor far easier. If you look at the code, you'll see we get the temperature and humidity readings from two code lines: `DHTtemp = DHT.temperature` and `DHThumid = DHT.humidity`. The 'DHT' is the object and 'temperature' and 'humidity' are functions in that object. If you're using the DHT22 sensor, change the `DHT.read11(DHTdata)` code line to `DHT.read22(DHTdata)`.

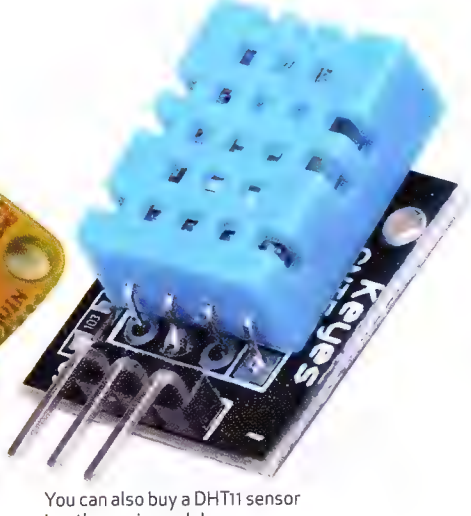
You can read more info at **playground.arduino.cc/Main/DHTLib**.

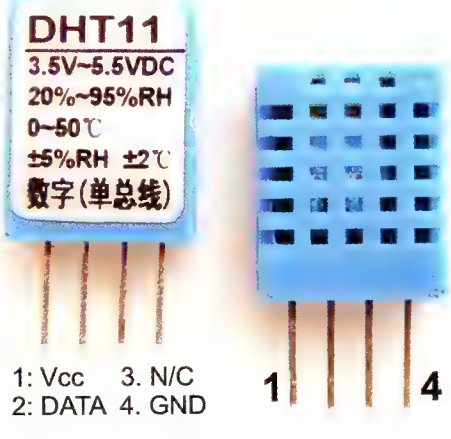
TRY IT YOURSELF

The DHT11 sensor can be had from eBay for under $2 including shipping and it's a great way to add environmental feedback into your projects in a low-cost, low-power way. And thanks to that free library, it's also extremely easy to code. ■



This higher-rated DHT22-based sensor module sells locally for $20.


You can also buy a DHT11 sensor in a three-pin module.



Pinout diagram for the DHT11 sensor (note: pin 3 isn't connected).

Guard your home with a Pi

Use your Pi to watch your home and alert you if it detects any intruders.

The Raspberry Pi is an impressive platform for prototyping projects of any scale. From a simple blinking LED to a quadcopter, anything is possible with a Raspberry Pi – all you need is a little imagination and some extra components. One of the most interesting areas of practical use is sensing the world around us, and using the data gathered in all sorts of ways. The world is full of data just waiting to be recorded and manipulated – for example, weather stations come with many different sensors to measure temperature, wind speed, humidity and pressure. All this data can be stored and manipulated by a savvy hacker to produce graphs and tables that can be imported into other applications or projects. And of all the sensors on the market, the cheapest and most simple is the humble PIR, which is present in so many parts of everyday life.

PIR PLANS

Passive infrared sensors (PIR) are commonly used in devices such as triggers for burglar alarms in homes and offices. In fact, they are so cheap that they're found inside motion-activated air fresheners, which could be a ripe source of components for this project. The PIR sensor works on the simple principle of sending a beam of infrared light into a room. If the beam remains unbroken – by which we mean there is no movement in the room – no action is taken. But the second the beam is broken, a signal is sent to a device that's programmed to respond in a certain manner. These PIR sensors are very cheap – around $4 delivered on eBay – and they are also an excellent starter project because they require very little breadboarding or prototyping.

For our project, we will set up a PIR sensor to watch an area for any movement. Once movement is detected, it will trigger the code to complete a sequence of events that will then capture a picture of the event and record a short 10-second video at a resolution of 640 x 480 pixels. The project will culminate with a text message being sent to our phone, alerting us to an intruder or other movements.

To explain how this project will work, we'll illustrate it using pseudocode, which is a way of explaining a programming sequence using easy-to-understand language.

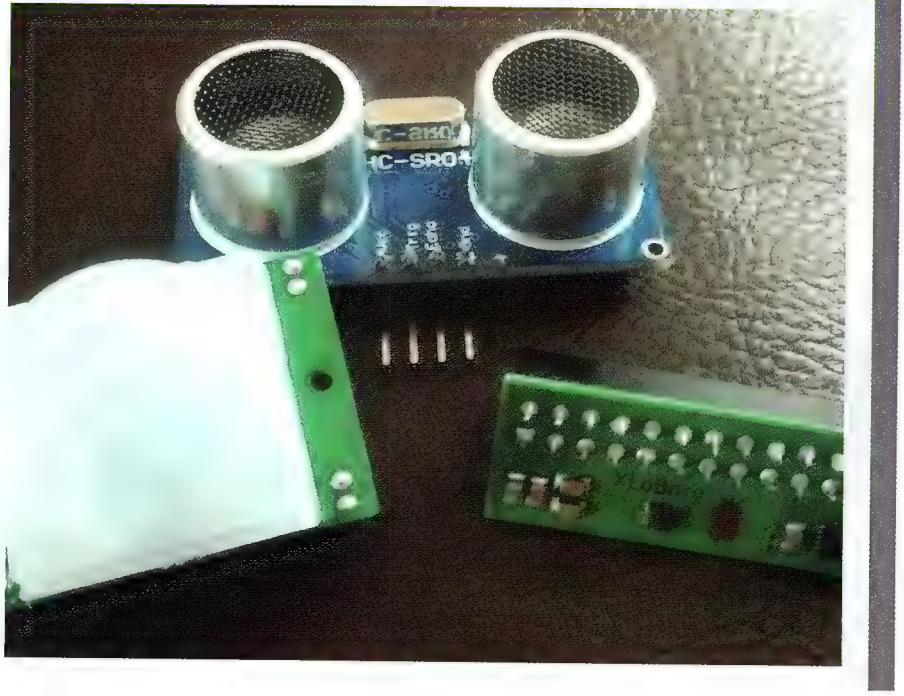
Here's how the project will work in pseudo code:

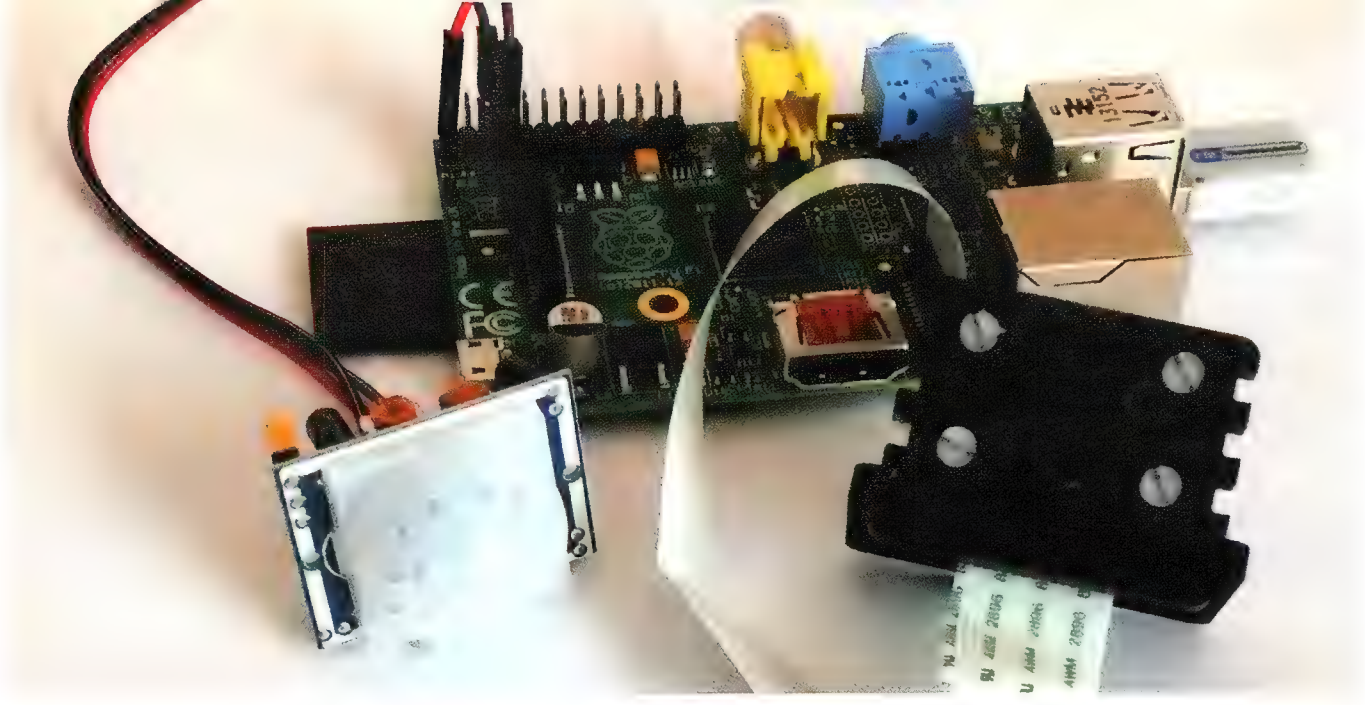
```
PIR sensor sends out a beam.
If the beam is broken.
Send a signal to our
Raspberry Pi.
On receiving the signal, the
Raspberry Pi will take a
picture of the activity.
The Pi will then record 10
seconds of video.
After the picture is
created, the Pi will attempt
to send a text alerting us to
the activity.
This text will contain a
picture and video .
Once the text has been sent,
the Pi will wait for 30
seconds before looping the
process.
```

So where could you use this project? The most obvious answer would be home security but let's think of something nicer. For example in the summer there are lots of plants growing and animals moving in the sunshine, so why not use your Raspberry Pi and this project to capture the joys of summer? You could house this project in a weatherproof case and leave it outside to record animal life. In fact, a project similar to this was used to monitor the feeding patterns of birds caring for their

Alternative inputs

Typically we think of input as a keyboard or mouse, but a sensor such as our PIR is a great way to introduce new forms of input to your projects. Other types of sensors include ultrasonic sensors, such as the HC-SR04, where an inaudible wave of sound is used to measure the distance from the sensor to the object. There's also XLOBorg, which has an accelerometer and magnetometer on board, and these can sense movement and orientation, and even compass directional changes. The Raspberry Pi camera and other webcams can also be used as simple sensors using a library called OpenCV. OpenCV stands for Open Computer Vision and is a library that enables your project to see the world around it. Example projects are face-tracking cameras and doors that only open to recognised faces. The Raspberry Pi opens up the world of sensors to a new generation of hackers.





offspring. A sensor was placed near the nesting box, and this would record the comings and goings of the parent birds. This data was then linked to weather data for that area. When comparing the data, it became clear that the natural food of birds – insects – were not as abundant when the weather was rainy or windy. This meant the offspring were not being fed as often.

ALERT! ALERT!

In this project, we're choosing to alert the user via a text message, because no matter what type of phone you have, and what type of signal you receive, a text message is more reliable as a method of delivery than an email or tweet, which rely on 3G or Wi-Fi coverage to receive data. This project can be built upon to include other methods of delivering the alert – in fact, you can send more than one alert from the project. To send an email, you can use the smtplib, and we found a great how-to at **tinyurl.com/2epxthe**.

You can also send a tweet from Python using the tweepy library. To do this you will need to create an application via **https://dev.twitter.com/**. Once you have completed this part of the process, you can import the API key into tweepy and use it to send and receive tweets. You can read more about tweepy via its web site: **www.tweepy.org**.

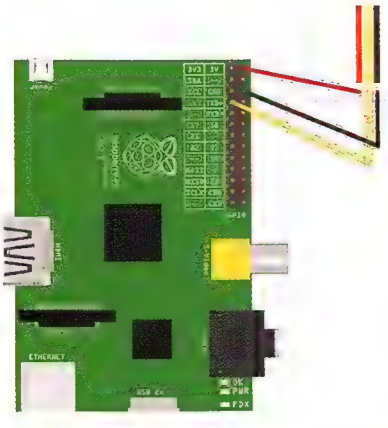
The pictures and video that are captured in this project are stored on our Raspberry Pi for later retrieval via any means that is convenient.

In brief, our goal is to build an alarm system with our Raspberry Pi that's triggered by a PIR sensor, which detects movement. Once the alarm is tripped, a camera will take a quick picture of the event, and then record 10 seconds of video. To alert the user that the alarm has been triggered a text message is sent. So let's get started!

Get kitted out

1 CONNECT THE PIR

Our PIR sensor needs three connections to work: VCC (5V), Out and Ground (GND). To connect our sensor to the Raspberry Pi, we need to use female to female jumper cables. You can buy them from many online retailers. On the sensor, locate the VCC pin and gently push a cable until it is firmly in place. On your Raspberry Pi, locate Pin 2 and gently push the VCC cable into place. We connect the VCC pin on the PIR sensor to a 5V pin on a Raspberry Pi, which is Pin 2. When connecting anything to the GPIO, ensure that the Raspberry Pi is powered off and that all connections are checked before powering on your Raspberry Pi.



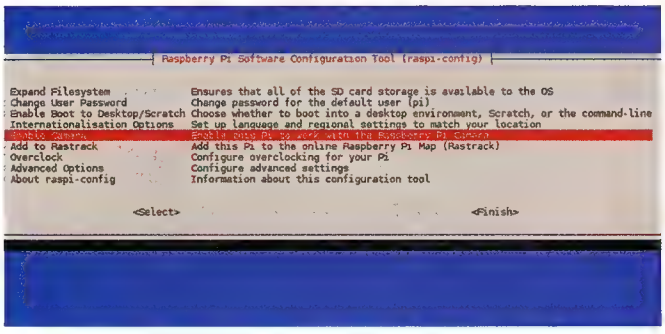
2 GROUND AND OUT

We then need to repeat the process and connect the GND pin of our sensor to GND on a Raspberry Pi, which is Pin 6. Lastly, we connect our Out pin to Pin 7. For our connection to the PIR sensor, we will require no resistors inline as the PIR has a diode to protect the board, and the signal sent via the Out pin is 3V and safe with our Raspberry Pi.

3 CONNECT THE CAMERA

Our next piece of hardware is the Raspberry Pi camera, and to insert the camera, you need to locate a plastic port between the HDMI and Ethernet port on the board. Gently lift the plastic lock from the port and then slide the ribbon cable into the slot, with the silver strips of the ribbon facing the HDMI port. Once fully slid into place, press the plastic lock back into its original position. The ribbon cable will now be locked in place.

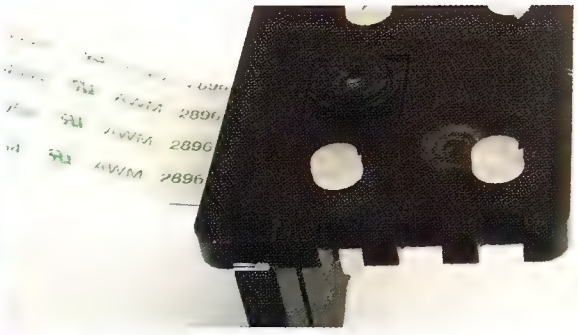
Software setup


Raspberry Pi Software Configuration Tool (raspi-config)
Expand Filesystem
Ensures that all of the SD card storage is available to the OS
Change User Password
Change password for the default user (pi)
Enable Boot to Desktop/Scratch
Choose whether to boot into a desktop environment, Scratch, or the command-line
Internationalisation Options
Set up language and regional settings to match your location
Enable Camera
Enable pi
Add to Rastrack
Add this Pi to the online Raspberry Pi Map (Rastrack)
Overclock
Configure overclocking for your Pi
Advanced Options
Configure advanced settings
About raspi-config
Information about this configuration tool
<Select>
<Finish>

1 ENABLE THE CAMERA

Now we have our hardware installed, it's time to configure the software that will control it. Firstly we need to set up our camera and that is done via this command — in a terminal type: `sudo raspi-config`

In the menu, there is an option to 'Enable the camera' — move to there and then press Enter. You will now be asked whether you would like to enable the camera, so move the cursor to Enable and press Enter. You will now return to the original menu, so move your cursor to Finish and press Enter.



2 TEST THE CAMERA

Now we have told the Raspberry Pi to use the camera, we need to test that it can take a picture, and the best way to do that is via this command in the terminal: `raspistill -o test.jpg` The command will launch an application to take a picture using the camera. If you encounter any errors, check that you have the correct syntax and that the camera is enabled in the raspi-config menu. The last thing to check should be the physical connection between the camera and the Raspberry Pi.

3 INSTALL PIP

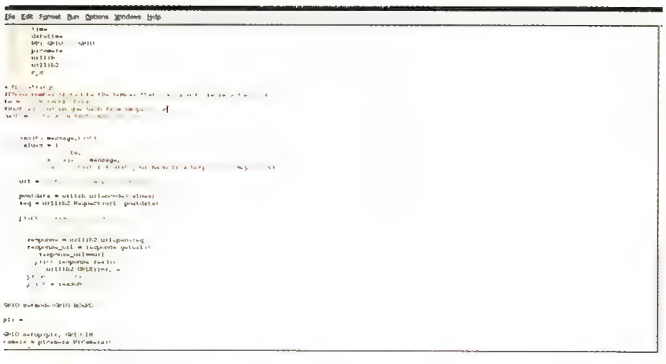
In order to use the camera with Python, we need to download the picamera library, and the best way to do this is via a package manager for Python called pip. Pip works in the same way that apt-get works on your Raspberry Pi, and it is a great tool to keep your projects up to date. To use pip we first need to install it via a terminal.

4 INSTALL PICAMERA

To install pip, type in the following:

```
sudo apt-get update
sudo apt-get install python-pip
sudo pip install picamera
```

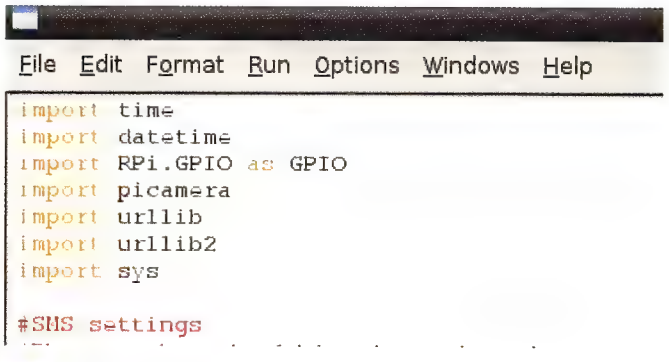
Pip will install the picamera library for Python. Now it is time to grab a copy of the project code. Download the project as a zip file from here: **https://github.com/lesp/PIR_Alarm/archive/master.zip**.



5 OPEN THE PROJECT FILES

To use the project files, we need to open idle, the Python editor, but because we are using the GPIO, we need to do so using sudo: `sudo idle`

This will open the idle application, and in the application, go to 'File > Open' and then navigate to where your project files are located. We will be working with pir_alarm.py.



6 ADDED EXTRAS

In our code we have a section that imports extra functionality; these are libraries. The first is time, which enables control of our program. Next we import datetime, which enables our program to use calendar dates and clock times. Next we import the RPi.GPIO library but rename it to GPIO to make it easier to use. We then import picamera which enables the use of the official Pi camera with Python.

Canny code

```
pir = 7

GPIO.setup(pir, GPIO.IN)
camera = picamera.PiCamera()
while True:
    if GPIO.input(pir):
        a = datetime.datetime.now()
        a = str(a)
        a = a[0:19]
        alert = ("Alarm at "+str(a))
        print(alert)
        pic = (a)+(".jpg")
        vid = (a)+(".h264")
        message = (alert),(pic),(vid)
```

```
def sms(to,message,hash):
    values = {
          'to' : to,
          'message' : message,
          'hash' : hash } # Grab your hash from http://www.smspi.co.u

    url = 'http://www.smspi.co.uk/send/'

    postdata = urllib.urlencode(values)
    req = urllib2.Request(url, postdata)

    print 'Attempt to send SMS ...'

    try:
      response = urllib2.urlopen(req)
      response_url = response.geturl()
      if response_url==url:
        print response.read()
```

1 STORE THE PIN NUMBER

Earlier we referred to connecting the Out pin of the PIR sensor to Pin 7 of our Raspberry Pi. Well, in order to be efficient with our code, we need to create a variable that stores the pin number ready for use in our code. To do that, use the following code:

```
pir = 7
```

By doing this, we can easily change the pin in our code if we need to.

2 ENABLE TEXT MESSAGES

Creating a function called sms() on line 14 is a great way to contain the code kindly provided by **smspi.co.uk**. Using three arguments called to, message and hash we can easily pass the target phone number, the alert message and the unique hash which permits the use of the SMSpi text message gateway. To use the text message service, you will need to sign up for a free login and hash to use in your project.

```
GPIO.setmode(GPIO.BOARD)

pir = 7

GPIO.setup(pir, GPIO.IN)
camera = picamera.PiCamera()
while True:
    if GPIO.input(pir):
        a = datetime.datetime.now()
```

```
GPIO.setup(pir, GPIO.IN)
camera = picamera.PiCamera()
while True:
    if GPIO.input(pir):
        a = datetime.datetime.now()
        a = str(a)
        a = a[0:19]
        alert = ("Alarm at "+str(a))
        print(alert)
        pic = (a)+(".jpg")
        vid = (a)+(".h264")
        message = (alert),(pic),(vid)
        camera.resolution = (1024, 768)
        camera.capture(pic)
        time.sleep(2)
```

3 EASIER CODING

In the code you can see: `GPIO.setup(pir, GPIO.IN)` This line of code sets our pin 7, which is referenced as a variable called pir, as an input, so that it waits to receive a signal from the sensor. The next line of code shortens the full picamera function down to just camera making it easier to work with.`camera = picamera.PiCamera()`

4 HOW THE MAIN LOOP WORKS

```
If the alarm is triggered.
Get the date and time and convert it to a string.
Alter the string to only contain the first 20 characters.
Create the message and file name for the alert.
Take the picture and record 10 seconds of video.
Use the sms function to send the alert to our phone.
Sleep for 30 seconds.
Loop the process if the alarm is triggered.
```

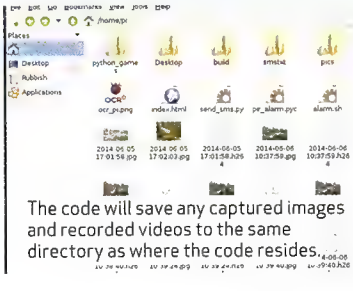
SMSpi

The team at **smspi.co.uk** has kindly provided its Python code for this project. SMSpi offers a free text messaging service for Pi-based projects. The SMSpi project is powered by Raspberry Pi; all your texts are routed via the same device that is powering our alarm.

The API can be dropped into most common programming languages, including CURL, PERL, Python, PHP and Ruby. To use the service, you need to sign up for a free login, which then allows access to the network via a hash that acts as your unique key.

Using the service, you can easily send SMS messages over the SMSpi network, as proven by this project, but you can also receive text messages and have them forwarded to an email address or posted to a web page for use in web apps. Once you have your hash, paste it into your Python project code on line 11.

With your alarm now installed and working, you need to remotely access your Raspberry Pi to see the pictures and video. The easiest way would be to remove the card and view the media on your computer. But you could enable SSH on your Raspberry Pi via the raspi-config advanced menu and then use your file manager to SSHFS into the folder where the pics are. If you are feeling adventurous, you could install lighttpd or nginx to serve the content over a network. The choice is yours but remember to be careful with sharing the images over an open connection to the internet.



The code will save any captured images and recorded videos to the same directory as where the code resides.

Java part 2 – Variables, input and interest rates

This month, we continue our Java Masterclass as Darren Yates introduces variables and how to get keyboard input from the user.

Last time, we started our coding journey with the NetBeans IDE and Java Development Kit, getting the 'Hello, world' app out of the way. We even had Java calculating the answer to life, the universe and everything. But in order to do some more serious coding, we need to introduce some new key concepts.

If you missed last month, we made Java calculate the answer to life, the universe and everything and display it to the console (command prompt, if you like) with the following code line:

```
System.out.println( "The answer to life is " + (7 * 2 * 3) );
```

Inside the second, inner brackets, Java is doing some multiplication for us, which is fine if all you ever want to know is 7 x 2 x 3. This is an example of 'hard coding' and it's not terribly useful because it doesn't do anything else.

Look at it another way – what if you had $1 million in a bank account earning 5% interest per year. How much have you earned after one year? We could write that again as:

```
System.out.println( "Interest earned: $" + (1000000 * 0.05) );
```

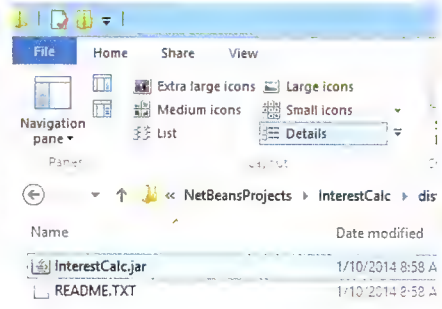
If you add this to our Java Application1.java code from last month, you'll get the answer:

```
Interest earned: $50000
```

And that's great – provided you knew what the source code was calculating. To the end-user, it means diddly-squat. To calculate different amounts this way, we'd have to change the source code every time and recompile it to calculate the answer. In a word, yuck. Instead, we can write a program that asks the user for the cash amount (the 'principal') and the interest rate, calculates the amount of interest earned and returns the answer to the console output.

SCANNER CLASS

To print text to the console, we've been using a special Java class called System and in particular, using the System.out.println (print line) function. System.out is Java's standard output device, which in this case is the computer screen. But Java also has a standard input device too – the keyboard – and we can use it to get data from the user. To do that, we use Java's Scanner class to read the keyboard input (System.in). The great thing about Java is that it's designed so that you can reuse code – you don't have to write everything from scratch and classes are one form that reusable code takes.



Building your app into a .jar file is the easiest way to distribute it.

APP #2 – INTERESTCALC

Let's start with a brand new project in our NetBeans IDE – choose File/New Project, ensure 'Java Application' is selected, click the Next button, change the Project Name to 'InterestCalc' and click the Finish button.

Now before we go off half-cocked, let's nut out what we want this project to do. This is actually the most important step because it helps ensure you don't start heading down rabbit warrens sign-posted 'feature-creep, this way', looking for great new ideas you probably don't need. So, here's what our program will do:

(INPUT) Greet the user and ask for three pieces of information:

- The amount of cash in the bank account
- The interest rate on the account
- The amount of time the cash is earning interest

(PROCESS) Calculate the total interest over that time.

(OUTPUT) Display the result back to the user.

It sounds pretty simple but having the plan in the first place is what makes it simple. It also follows a very simple programming model called IPO – input, process, output.

GETTING INPUT FROM THE USER

To begin, the first thing we need is to import Java's Scanner library code into our project – this is brilliant because it just saves so much time. To do this, we add the following line to line 8 of our project code:

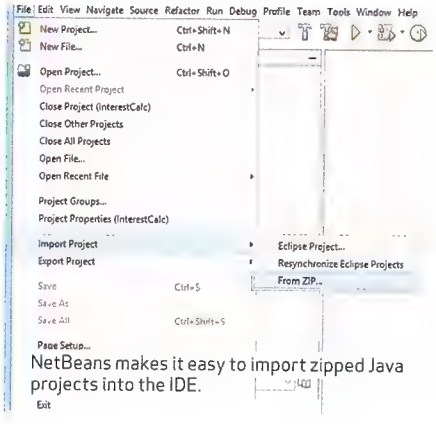
```
import java.util.Scanner;
```

Beware the capital letters! Java is case-sensitive so always put the upper-case letters in when asked, otherwise, you'll generate syntax errors. The first code statement in your java code should always be the 'project' statement – after that, you put in any java classes you wish to import. Now we're ready to write our program inside the main section or 'method'.

The first thing we do is use the Scanner class to create a new Scanner object called 'input':

```
Scanner input = new Scanner(System.in);
```

Classes are one of Java's most important features and we'll talk a lot more about them in the months ahead. The standard convention is that class names begin with uppercase letters and objects/variables with lower-case to help you distinguish between the

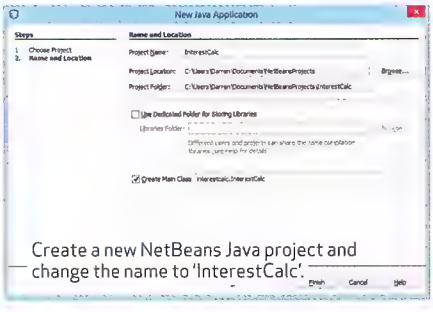


NetBeans makes it easy to import zipped Java projects into the IDE.

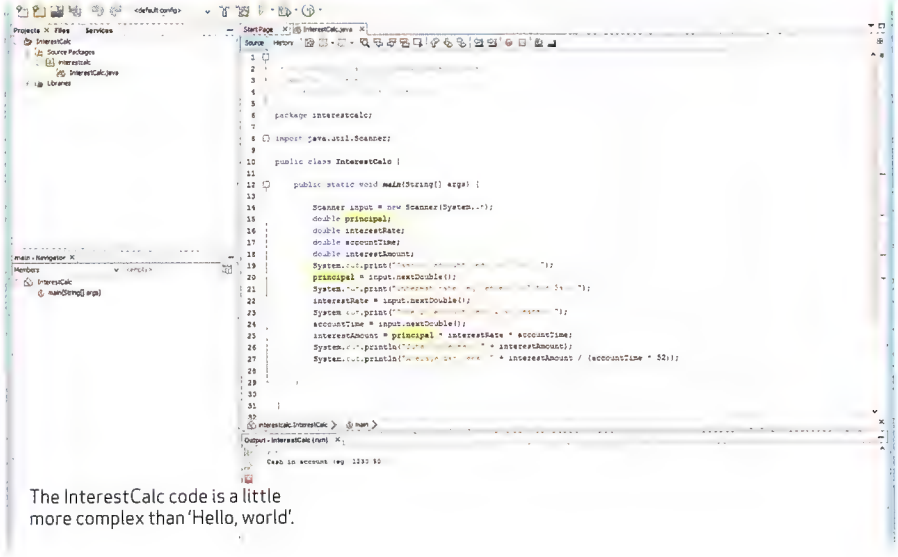
two. This code line assigns a new Scanner object listening to the keyboard (System.in) to the input variable.

VARIABLES

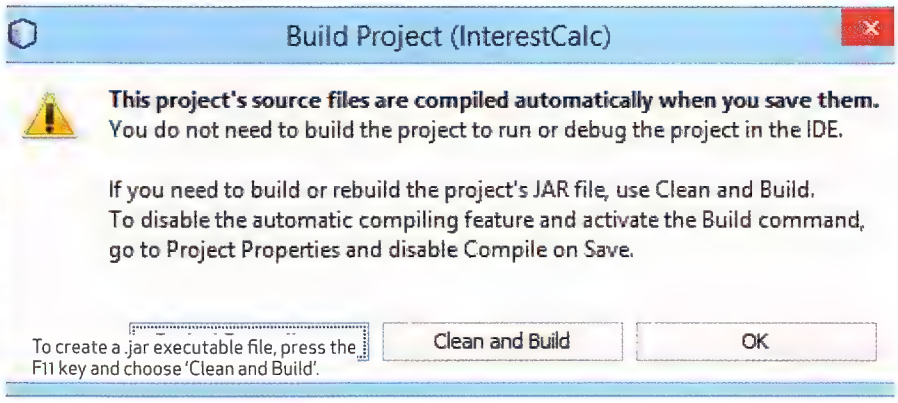
So what's a variable? A variable is essentially a chunk of memory in your computer you can use to store stuff – numbers, strings of characters, photos, whatever you want – but rather than having to know its exact logical location, we can define that chunk by a data type and a name and let Java look after where it's kept. In the case of the Scanner statement, we're assigning the chunk of memory to the variable 'input' and we're declaring it to be a new Scanner object. Not making any sense? Try this – think of a variable as a big coffee mug. You know – the one on your desk, holding those pens, pencils and your takeaway Thai chopsticks? On the mug, you write the variable's name, decide what type of stuff or 'data' it'll hold and load it up with whatever matches the designated data type. You can create any data type you wish, but Java comes with some basic common ones called 'primitive data types'. They include 'integer' (whole numbers), 'double' (decimal-point numbers) and 'boolean' (true or false). When you create or 'declare' a variable, you declare its datatype and its name. Let's declare some variables for our InterestCalc program, using the following code:



Create a new NetBeans Java project and change the name to 'InterestCalc'.



The InterestCalc code is a little more complex than 'Hello, world'.


Build Project (InterestCalc)
This project's source files are compiled automatically when you save them.
You do not need to build the project to run or debug the project in the IDE.
If you need to build or rebuild the project's JAR file, use Clean and Build.
To disable the automatic compiling feature and activate the Build command, go to Project Properties and disable Compile on Save.
To create a .jar executable file, press the F11 key and choose 'Clean and Build'.
Clean and Build
OK

```
double principal;
double interestRate;
double accountTime;
double interestAmount;
```

We're declaring the variables principal, interestRate, accountTime and interestAmount to be of type 'double', which means they can each hold a decimal number (including integers, kind of). This step is vital because you cannot assign any value to a variable without first declaring what type it is.

Notice a couple of things here – first, we've used plain English words for the variable names. This is a good habit to get into, rather than just using 'x' or 'y', because, again, it makes your code easier to read. Note too that 'interestRate' uses a lower-case 'i' but uppercase 'R' – this is another programming convention to again help ease of reading and object identification.

Now we ask the user for the data we need:

```
System.out.print("Cash in
account (eg. 1230.50): ");
principal = input.
nextDouble();
System.out.print("Interest
rate (eg. enter 0.05 for 5%):
");
interestRate = input.
nextDouble();
System.out.print("Time in
account (eg. 2.45 years): ");
accountTime = input.
nextDouble();
```

Note the pair repetition here – we start with a print statement asking the user for data and in the next line, the data comes from the input.nextDouble function and is assigned to a variable. The nextDouble function knows to wait for and take the next numeric data entered in (literally, it waits for the Enter key to be pressed) and store that in the assigned variable.

Note the text string is printed using 'print', not 'println' as we did last month. The println function adds a carriage-return or line-feed to the end of the string of text, meaning our user command prompt would start on the next line. Using print instead keeps the cursor at the end of the line, which just looks a bit neater.

MATHEMATICAL EXPRESSION

Now we get to the meat and three-veg of our code – the actual calculation and we can do it in one line of code:

```
interestAmount = principal *
interestRate * accountTime;
```

Missed part one?

If you missed part one of our new masterclass, there's still time to get aboard — grab Java Development Kit 8 and NetBeans 8.0.1 from the links below. They're available for Windows, Linux and Mac OS X, so whatever your poison, there's no excuse not to get coding! Our tip? Install JDK8 first, followed by NetBeans 8.0.1 — it makes things so much easier!

JDK8 — **www.oracle.com/technetwork/java/javase/downloads/**

NetBeans 8.0 — **netbeans.org/downloads/**

In other words, we multiply the values inside the 'principal', 'interestRate' and 'accountTime' variables and assign the result to the variable interestAmount. This is an example of a 'mathematical expression' – a very simple one, but that's what it's called.

The last thing we have to do is write the answer back to the user via the console:

```
System.out.println("Total
interest: " + interestAmount);
```

Now each time we run this program, we can load in different values for principal, interest rate and time in the account and get the right result. But since we have the yearly interest amount in a variable called 'interestAmount', we can do something else with it too – like, work out the equivalent amount of interest per week. We can do it on-the-fly with another print statement:

```
System.out.println("Average
per week: " + interestAmount/
(accountTime * 52));
```

We're taking the total interest amount and dividing it by the years the money is in the bank multiplied by 52, which will give us the equivalent interest earned per week, assuming it is paid once a year and not reinvested. This 'on the fly' calculation is called an 'inline expression' because we're doing it 'in the same line' as printing the text string to the console. There's only one problem – loading the IDE every time we want to run the app is a bit of overkill.

BUILD A STANDALONE APP

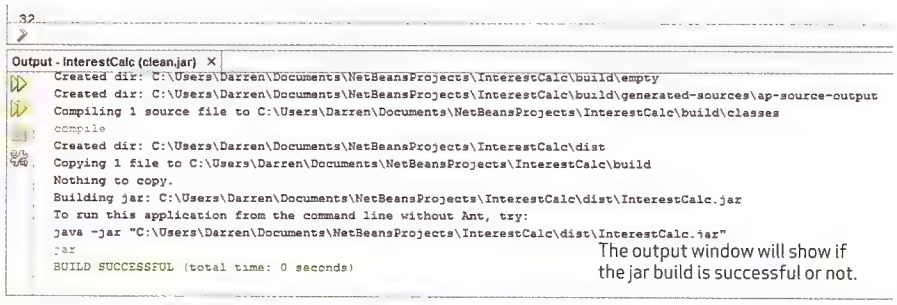
Well, this isn't exactly true – you can't really build a Java 'standalone' executable because that's not the way Java works. Java is sometimes considered a bit weird in that you compile the source code but you don't create an executable file – you create an intermediate form called 'bytecode' that still needs to be interpreted by what's called a Java Virtual Machine (JVM). The reason for doing this is that bytecode is still portable – you can run Java bytecode on any device with a JVM. In fact, this is exactly the way every Android device works. When you grab an app from Google Play, you're downloading bytecode – the same bytecode, regardless of whether you're using a Galaxy S5 or an el-cheapo $50 tablet. The devices can be completely different on the inside (CPU, RAM etc), but because they both run a JVM, they can load the same bytecode and run the app (assuming they're running a similar Android OS).

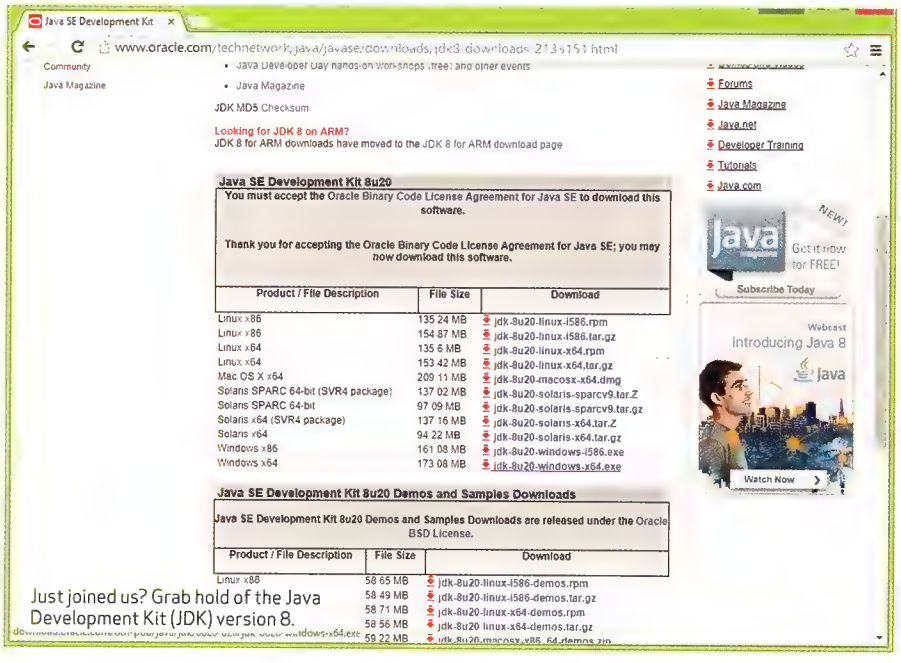
But while you can't build an executable, you can build a Java Archive (.jar) file and that file will launch from the command line – all you need is a Java Runtime Engine (JRE) that matches the JDK version you coded the app with. Clear as mud? Let's use our InterestCalc app as a quick example.

First step, with your app loaded, choose 'Run > Build Project' from the NetBeans IDE menu or just hit the F11 key. You'll likely see a warning indicating you don't need to do this to run the project in the IDE – but you do to create the .jar file, so click on 'Clean and Build'. Once you see the 'BUILD SUCCESSFUL' sign in the output window, head to your /documents/NetBeansProjects/InterestCalc/dist folder and inside you'll see the .jar file. Open up a command prompt in that subfolder and run the command:

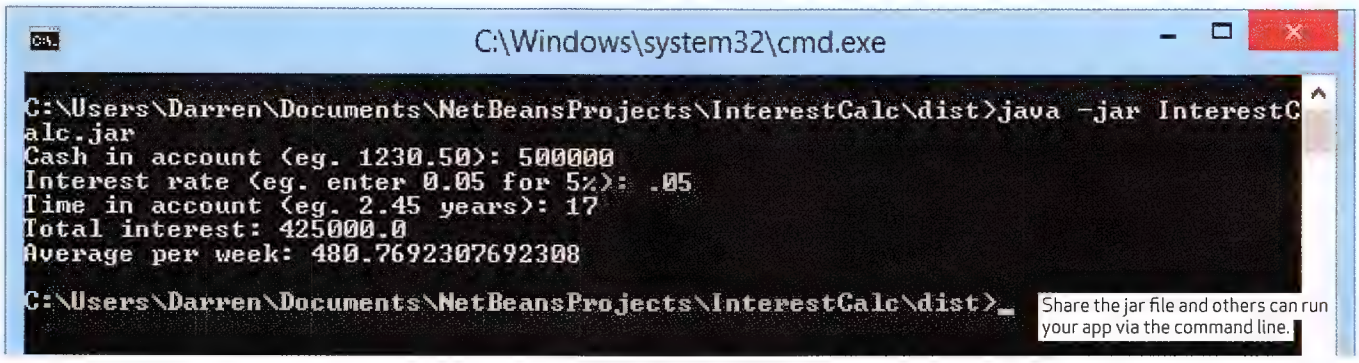
```
java -jar InterestCalc.jar
```

Quick as a flash, you should be asked to enter in your cash amount. You can now give that .jar file to anyone with a JRE installed and they'll be able to run this command and your app.


Output - InterestCalc (clean.jar)
Created dir: C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\build\empty
Created dir: C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\build\generated-sources\ap-source-output
Compiling 1 source file to C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\build\classes
compile:
Created dir: C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\dist
Copying 1 file to C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\build
Nothing to copy.
Building jar: C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\dist\InterestCalc.jar
To run this application from the command line without Ant, try:
java -jar "C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\dist\InterestCalc.jar"
jar:
BUILD SUCCESSFUL (total time: 0 seconds)
The output window will show if the jar build is successful or not.


Java SE Development Kit
www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html
Java SE Development Kit 8u20
You must accept the Oracle Binary Code License Agreement for Java SE to download this software.
Thank you for accepting the Oracle Binary Code License Agreement for Java SE; you may now download this software.
Java SE Development Kit 8u20 Demos and Samples Downloads
Just joined us? Grab hold of the Java Development Kit (JDK) version 8.

Java has multiple ways of taking user input from the keyboard...

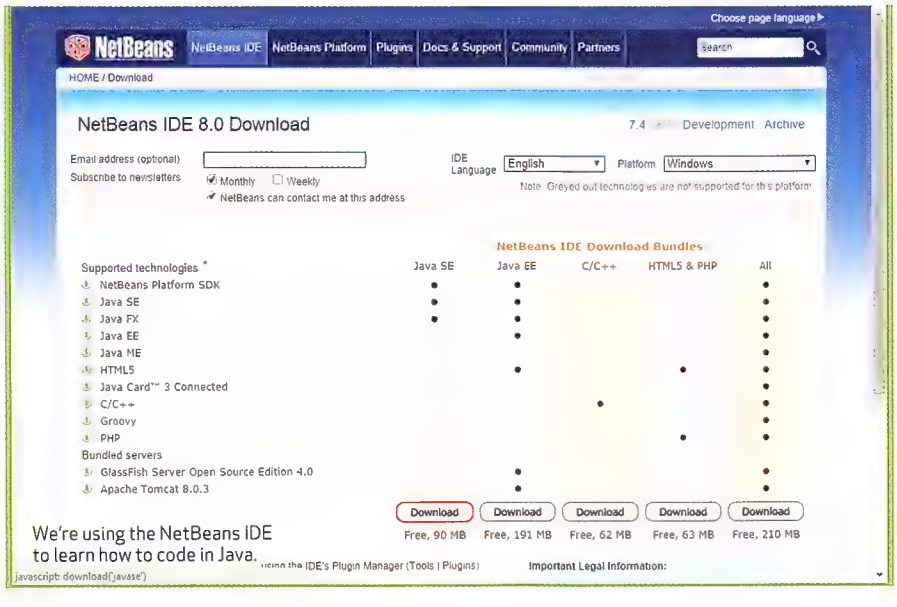

C:\Windows\system32\cmd.exe
C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\dist>java -jar InterestCalc.jar
Cash in account (eg. 1230.50): 500000
Interest rate (eg. enter 0.05 for 5%): .05
Time in account (eg. 2.45 years): 17
Total interest: 425000.0
Average per week: 480.7692307692308
C:\Users\Darren\Documents\NetBeansProjects\InterestCalc\dist>

Share the jar file and others can run your app via the command line.

```
HelloWorld.java
Source  History
1  /*
2   * To change this license header, choose License Headers in Project Properties
3   * To change this template file, choose Tools | Templates
4   * and open the template in the editor.
5   */
6
7  package helloworld;
8
9  /**
10  *
11  * @author Darren
12  */
13 public class HelloWorld {
14
15     /**
16      * @param args the command line arguments
17      */
18     public static void main(String[] args) {
19         System.out.println("Hello, world!");
20         System.out.println("The meaning of life is " + (7 * 2 * 3));
21     }
22
23 }
24
```

```
HelloWorld > main >
Output - HelloWorld (run)
run:
Hello, world!
The meaning of life is 42
BUILD SUCCESSFUL (total time: 0 seconds)
```

Every coder has to write a 'Hello, world!' app — here's ours from last month.

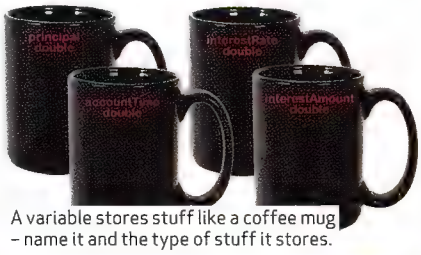


We're using the NetBeans IDE to learn how to code in Java.

You might be thinking this is a bit clunky and that a standalone executable that doesn't need a runtime engine would be better. Sure, it probably would — but you'd also need to compile separate versions for Windows, Mac OS X, Linux, Android, Unix and any other system you want to run the app on. With Java, as long as the user can get hold of a JRE for their OS, you only need the one .jar file and they can run it.

PRACTICE!

It might not seem like it, but right now, you have enough basic tools to write your own very simple apps. There's much more to learn and we'll be back next month, but in the meantime, hack around with this month's project — modify it or even start your own project from scratch. Coding is all about practice — the more you do, the better you get!



A variable stores stuff like a coffee mug – name it and the type of stuff it stores.

Get the InterestCalc source code

Any time we produce a full program, we'll make the source code available on the *APC* 'magstuff' page on our web site at **www.apcmag.com/magstuff**. You'll find the full source code for this month's InterestCalc project there. Loading it up is easy — just download the zip file, open up NetBeans, select 'File > Import Project > From ZIP' and choose the downloaded zip file. Use the Project tab on the left explorer window to navigate to Source Packages, find the InterestCalc.java source code and double-click on it to load it into the edit window.

downtime

» GAMES - EDITED BY TROY COLEMAN

apc HOT PRODUCT

FROM $79.99 | PC, XBOX 360, XBOX ONE, PS3, PS4 | ALIENISOLATION.COM

Alien: Isolation

Could this finally be the *Alien* game that doesn't disappoint?

Set fifteen years after the original film, *Alien: Isolation* sees you playing as Amanda Ripley, daughter of Ellen, an engineer for megacorporation Weyland-Yutani. She's on a journey to the space station Sevastopol when she learns that the flight recorder for her mother's lost ship, the Nostromo, is being held there. But it's clear from the moment she gets to the abandoned space-city that something is horribly wrong.

Sevastopol is a labyrinthine warren of corridors, vents and tunnels – it's being decommissioned and is in a severe state of disrepair. Most of the game is spent in the claustrophobic confines of its twisting metal bowels.

But while we've explored environments like this before in games like *System Shock* and *Dead Space*, it's the art design that sets *Isolation* apart. Resisting the urge to create a slick, contemporary vision of the future, The Creative Assembly have instead looked to the production design of the film for inspiration. They've built their world as Ridley Scott and his team would have in 1979, using only technology from the period.

The chunky keyboards, phone receivers, distorted CRT monitors, and blinking coloured lights should look dated, but it has quite the opposite effect. This is a tactile, practical, and convincing science-fiction world, with machines and environments that are functional and utilitarian, rather than overtly futuristic. You almost feel like you can reach out and touch it.

CREATURE DISCOMFORTS

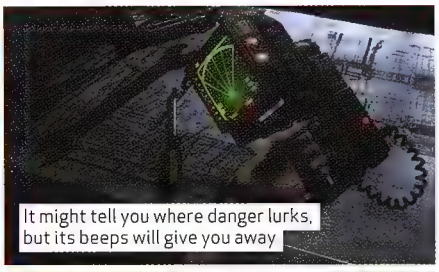
But a sci-fi corridor isn't much without something horrifying to chase you down it. So it's a good thing that *Isolation* is the first game to make HR Giger's alien every bit as formidable and intimidating as it is in the films. In *Alien*, Ripley asks Ash how they can kill the creature that burst from Kane's chest aboard the Nostromo, and he replies, gravely: "You can't." This, unlike the dumb drones you blasted your way through in *Colonial Marines*, is true of Sevastopol's alien. It's merciless and unstoppable.

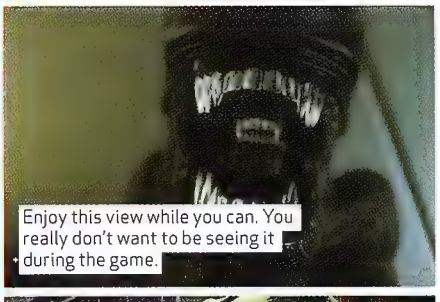
You can shoot it, but it'll just get angry and pounce at you. You can burn it, but that'll only scare it away for a few seconds. *Isolation*'s magic lies in the fact that you have to outsmart its single alien rather than kill it. This turns what could have easily been yet another FPS with xenomorphs into a thrilling, drawn-out game of cat-and-mouse with the scariest cat imaginable. It's a deft blend of stealth and survival horror that, thanks to dynamic AI and clever, systemic design, is much more than the sum of its parts.

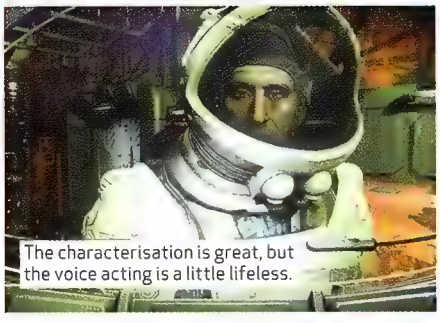
You'll know when the alien is near. As you creep through the station, you hear it above and below you, behind the walls, under the floor. You're relatively safe when it's hidden away like this, but you never know what vent, crack or hole in the ceiling it'll suddenly emerge from. It arrives with a beastly hiss – a sound that becomes your cue to hide or run. Then you hear the pounding of its footsteps as it wanders the corridors, hunting for its prey.

The alien is an almost constant threat, but there are other dangers on Sevastopol. Malfunctioning androids called Working Joes wander the station, brutally killing any humans they come across. Their rubbery, emotionless faces and glowing eyes are genuinely unnerving. Get too close and they'll grab you, draining your health until you manage to break free. You can kill them, but they take a lot of resources to bring down, making stealth the best option.

A burst of fiery justice can see the alien off – but for how long?


It might tell you where danger lurks, but its beeps will give you away


Enjoy this view while you can. You really don't want to be seeing it during the game.


The characterisation is great, but the voice acting is a little lifeless.

KEEP IT DOWN

Then there are other survivors. You'll run into them less often, and they're a lot easier to kill, but they usually work in groups. They won't shoot on sight, and will give you a few seconds to back away if you wander into their territory, but it doesn't take much to send them into a frenzy of gunfire. Luckily, if they shoot at you, the noise will attract the alien and it'll kill them all. This is often the best way to get past human enemies: provoke them, then wait for the bloodbath.

Whichever enemy you're up against, sneaking is always the key to survival. You'll pick up a shotgun, a revolver and a few other weapons as you progress through the station, but they're more of a curse than a blessing. For one, they're only really effective against humans. It takes a dozen headshots with the revolver to drop a Working Joe, and the alien is essentially bulletproof.

Any noise, from sprinting to knocking a chair over, will give your position away, so you'll spend much of the game creeping methodically between objectives. This might sound dull on paper, but the presence of the alien makes almost every moment exhilaratingly tense.

The audio design is just as accomplished, using many familiar effects from the film, like the metal scrape of vent covers opening and the electronic chatter of the computers. But it's also a vital part of the stealth, and I advise playing with a good pair of headphones or surround sound – you can track the movement of the alien by sound alone, gauging its distance and position by its footsteps.

As Ripley Junior is an engineer it's a good excuse to add a crafting system to the game. Raw materials litter your surroundings and can be taped together to create useful items. As well as the noisemakers and Molotovs, you can make smoke bombs, EMP mines for disabling synthetics, and blinding flashbangs. The effects of these are all temporary, but if you stun an android with a mine, you can whack it over the head with your wrench for an easy kill. Flares can be tossed to lure the alien, and if you toast it with your flamethrower it'll scream and run away – but not for long.

Combining items and weapons in interesting ways, and playing with the enemy AI, gives the game a lot of unexpected depth and kept it interesting for the entirety of the 25 hours it took me to finish it.

Yeah, that's right: twenty-five hours. This is a long game, but it never outstays its welcome. This is down to the pacing, which is pretty much perfect.

But now for the weak link. The story is disappointing, retelling a familiar yarn we've already heard countless times in the *Alien* universe. The good thing about this is that it lets you relive classic *Alien* moments and experience them from a more visceral perspective. The bad is that it feels derivative, never taking the chance to make its own mark on the mythology.

They've done an excellent job with the PC version. On ultra settings at 1080p, the game runs at a solid 60 frames on my fairly decent GPU at work, and loiters somewhere around 30-40 on the relatively ancient card in my home PC. The geometry of the levels is pretty simple when you look at it closely – especially with all that lo-fi retro tech – but it's the beautiful volumetric lighting and smoke, detailed levels filled with clutter, and bold visual design that give it its fidelity.

It's ridiculous that it took the developers of a historical RTS so long to finally create an authentic *Alien* game, but The Creative Assembly have managed it. They've succeeded where countless others have failed by treating Giger's monster with the reverence it deserves: as something to be feared and respected, not faced head-on with a pulse rifle. *Isolation* is a taut and electrifying horror game that perfectly captures the essence of the legendary film. I just wish they'd been a little braver with the story.

■ Andy Kelly

Verdict

The game the *Alien* series has always deserved. A deep, fun stealth game set in an evocatively realised sci-fi world.

★★★★½

The Nightmare Cooperative

A close partnership taken a tad too far.

FROM $4.99 | PC, IOS, ANDROID | LUCKYFRAME.CO.UK/NIGHTMARE

Your aim is to pilfer bling from psychotic monsters, try to not get killed, and survive 16 screens of turn-based mayhem. Each of the algorithmically created screens takes place on a small grid, peppered with walls, chests, gold, power-ups, traps and monsters. Open a chest and more hazards appear, determined by the number on said chest; a countdown adds to the tension, further foes arriving when it hits zero. Problems are exacerbated by the 'cooperative' aspect of the game — swipe and your entire team moves as one. Additionally, you can recruit dozing allies *en route*, and so before long you're faced with tricky decisions — a single swipe could mean riches for a mage and a speedy exit for a ninja, but your archer getting a beating and your miner taking a dip in an acid pool. The game's turn-based nature means you can take your time, and health pick-ups and potions are helpful for activating special powers that are unique to each team member and fun to discover. Initially the game seems tough, but once you figure out its mechanics, you'll have a ball bludgeoning your way through dungeons. Its finite structure means you're not faced in every game with an endless trudge to better your strategy and high-score. In all, this is a fantastic, polished puzzling dungeon-crawling.

■ Craig Grannell

Ornate weapon sheathes are all the rage in Middle-earth.

apc RECOMMENDS

FROM $79 | PC, PS3, PS4, XBOX ONE, XBOX 360 | WWW.SHADOWOFMORDOR.COM

Middle-earth: Shadow of Mordor

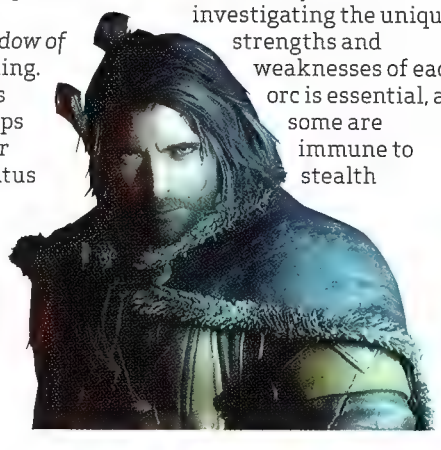
Orcs are stupid but this action-RPG is undeniably smart.

For the first couple of hours *Shadow of Mordor* is an annoying game. The systems are impenetrable, the parkour is unwieldy and the combat is an absolute grind. Add to that the bland (and interminably brown and dull green) landscape of Mordor, and Monolith Productions' effort seems undercooked at best, and a chore at worst.

Then it gets much better. Make no mistake: *Shadow of Mordor* is a strange game. For a blockbuster video game to bludgeon the player with so many new systems on an extremely steep learning curve is very brave. For anyone patient enough to stick through and parse the onslaught of information, *Shadow of Mordor* is rewarding.

It's the Nemesis system which helps *Shadow of Mordor* transcend the status of a second grade *Assassin's Creed* clone. Warner Bros' marketing material made a big deal about this, and it turns out they were barking up the right tree. The system personalises your conflicts with Mordor's orcs: engage in combat and you've made yourself a permanent enemy. If the orc runs away, his underlings will lose respect for him and thus he'll hate you more. If he kills you, he'll level up and become stronger, meaning more is at stake in death than simply having to restart from a checkpoint.

This system runs deeper than you initially suspect, and influences the main campaign line in interesting ways. In one early mission the player is tasked with offing four warchiefs, which at that point are the strongest orc foes. During this mission you'll learn that investigating the unique strengths and weaknesses of each orc is essential, as some are immune to stealth takedowns, sword combat and more. Die to one of them though, and the game gets incrementally more difficult. Stealth and tactical planning is essential in *Shadow of Mordor*: ignore these elements and you'll have a horrible time. Embrace them though, and you'll find one of the most surprisingly complex and satisfying stealth games in recent memory.



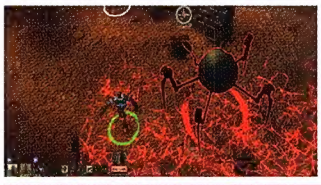
It's not perfect: Mordor's two distinct regions are drab and repetitive, offering few incentives for exploration. On console the controller interface feels too fiddly and overwhelming at times. Absorb the game's complexities though, take it slowly, and *Shadow of Mordor* is immensely satisfying. Just don't bumrush the orcs unprepared: they'll take you down every time.

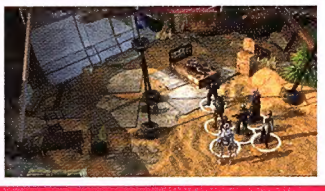
■ Shaun Prescott

Verdict

A steep learning curve and interesting, if obtuse, systems results in a future cult classic.

★★★★☆





US$59.99 | PC | WASTELAND.INXILE-ENTERTAINMENT.COM

Wasteland 2

A hardcore RPG twenty-six years in the making.

Wasteland 2 begins much as its predecessor did – choose or create four new recruits to the shining beacon of law and order in post-nuke Arizona, the Desert Rangers. One of your own has been murdered while investigating strange radio transmissions, and you must solve the mystery of his demise.

Each character has six basic stats. Coordination, for instance, affects your ability to shoot, as well as how steady your hands are when jimmying a lock or disarming a bomb. These abilities tie into skills. Some are obvious, such as brawling and handguns. Others seem useless at first; who would focus on repairing toasters? I did, and some of my best experiences (and loot) came from bringing life to a discarded appliance.

Even with four characters under my control, I struggled to find a balanced mix of skills and abilities. This is by design, and it nicely complements the companion NPCs who join you on your travels. You can add up to three followers for a maximum party size of seven. Each NPC has their own agenda, and if your goals don't align, they can leave in a huff.

Combat feels like a mix of *XCOM* and *Fallout*: encounter a group of enemies, get a turn order, then spend action points moving and attacking. Cover is useful, adding a defensive and aim bonus, but is often destructible, so maybe those crates aren't as safe as you thought.

The people of the wastes are rarely friendly, but often need your help. There were few easy decisions as I struggled to prioritise one group over another. Early on, for instance, I received distress signals from Hightown and an agricultural centre, both needing urgent assistance. I saved the ag centre first, battling mutated plants and giant, man-eating rabbits, but when I got to Hightown, the attacking raiders had killed everyone. Oops. Once you leave Arizona, you'll meet even stranger people in LA. God's Militia are standard religious fanatic types, punishing sinners down the barrel of a gun. Angel Oracle is a stadium taken over by Mannerites, who believe the key to restoring society is extreme politeness. On a call-in radio show, their leader, Mr Manners, counsels a woman who must choose to save either her husband or her children from raiders. Manners suggests the husband, since it's not becoming in society to be a widow and she can always have more kids.

This is where *Wasteland 2's* writing and voice work really shine, The Mannerites and their rivals, the get-ahead-in-life Robbersons, are inspired by self-help books, and watching the groups tear each other apart over philosophies that seem trite today is amazing.

There are issues, but they're surmountable. Weighed against the sheer amount of content in the game – my 50 hours skipped entire subplots and side areas – they're small problems. This wasteland is deep and dark and dangerous, and one well worth getting lost in. ■ **Cory Banks**

Verdict

An excellent RPG despite its share of glitches, with combat and writing every bit as good as its predecessor's.

★★★★☆

Disney Infinity 2.0 Edition

No need to stop and Marvel.

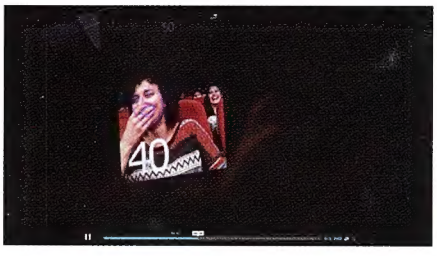
$99.95 | PS4, XBOX ONE
INFINITY.DISNEY.COM

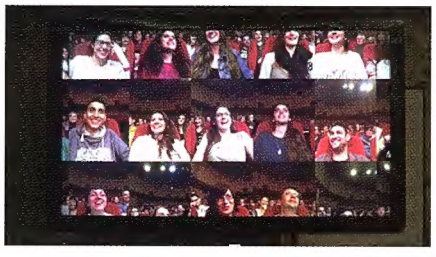
With one cutesy instalment under its belt, the *Skylanders* rival is back — and this time it's packing a Marvel-shaped trump card. For anyone who's new to this whole games with toys thing, *Disney Infinity 2.0* is an open-world platformer coupled with a vast creation suite for colourful comic world-building. The pantheon of Disney favourites from the last game were by no means a boring bunch, but there's something about hurtling through the clouds as Thor that's far more empowering than boring old Sulley. Heroes (including those from the first game) have bespoke skill trees that unlock nifty new abilities as you level up. The *Minecraft*-aping Toy Box mode returns and once again offers a ton of creative options. It's the real star gracing *Infinity's* bumper package, and the addition of Marvel shows just how far the concept has come since its inception in the *Toy Story 3* game. It's just a shame that the gameplay at the heart of its Story content hasn't pushed on. Missions cycle between the same 'protect this/beat them up' template, while starring city Manhattan is lacking meaningful side-activities. So while the Marvel factor makes Toy Box mode more fun than ever, it fails to provide the impetus needed to move the series forward on all fronts. ■ **Dom Reseigh-Lincoln**

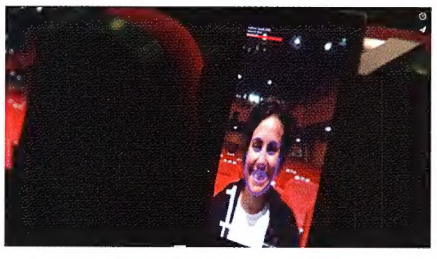
Funny business

Laugh yourself all the way to the bank.

In further proof that facial recognition is about to take over the world and turn a walk down to the local shops into some nightmarish, privacy-less *Minority Report* scenario, a Spanish comedy club has installed facial recognition devices into its seating in order to gauge patrons' enjoyment and charge them *by the laugh*. We're not making this up, honest. The Teatreneu theatre in Barcelona, which implemented this bizarro innovation with the help of advertising agency The Cyrannos McCann, charges approximately 44 cents per laugh, with a cap set at $35 for any given show. According to the BBC, the system has been a major success and is now being copied by other clubs in Spain, after a tax increase on conventional theatre tickets led to poorer attendances across the country. Which leads us to wonder exactly how long it'll be before we see pay-per-laugh arrive on these shores?







Virtual Hollywood?

We'll have to admit: we didn't see this one coming. After all, of all the exotic places virtual reality could theoretically transport you to – unseen alien worlds and so on – one of the biggest areas of focus for headset-making companies like Oculus VR is actually to simulate the experience of going to the movies. Virtual cinema apps are reportedly in fast development by Oculus and movie-streaming provider M-GO, designed to give the wearer the experience of sitting in a virtual theatre. Multiple cinema-style options are selectable – from oversized IMAX-esque spaces through to more intimate venues – and as the user turns their head, they can take in the cinema around them (when not paying attention to the movie playing, of course). It all sounds rather intriguing and could indeed prove to be a killer alternative app for the technology, but we're forced to wonder: can the epic feeling of sitting in an audience and watching an amazing blockbuster really be replicated without said audience, when you're sitting on the couch, on your lonesome, wearing your PJs and some funny goggles? We're excited... but remain to be convinced.

Bitcoin-gate continues

It was one of the most publicised media misfires of the year. *Newsweek* magazine in the US returned to print in high drama with a provocative, headline-grabbing cover story, claiming to have unearthed the identity of Satoshi Nakamoto, the shadowy and mysterious creator of digital currency Bitcoin. The magazine made the case that one Dorian Nakamoto, a former engineer with health problems living in California, was secretly the elusive Bitcoin inventor – but *Newsweek's* circumstantial evidence (and the aggressive manner in which it published the story) saw the magazine widely criticised for sloppy journalism. For his part, Dorian Nakamoto steadfastly denied *Newsweek's* assertions and announced he was considering legal action against the publication. Now a legal fund, **www.NewsweekLied.com**, has been set up to help Dorian Nakamoto fund his lawsuit against the publisher. The kicker: in addition to accepting donations via credit card, the fund is also accepting payments... via Bitcoin! You couldn't make this stuff up. Will Dorian Nakamoto's crypto-nemesis prove the financial means of his potential legal triumph? ■

Natcomm
AUSTRALIAN INNOVATION

20+ YEARS SINCE 1990

Ph (07) 5596 5128

Telecommunications Solutions

SAVE MONEY • IMPROVE EFFICIENCY • ADD A PROFESSIONAL TOUCH

FAXSTREAM DUET AND FAX SWITCHES

- Duet Switches for Home or Business
- Fax Switches for Home or Business
- Save rental costs for a separate fax line
- Easy user installation

DOOR PHONE INTERCOM FOR HOME TELEPHONES

- Will ring all Telephones, just answer to talk
- Works with Cordless Phones
- Can open Doors or Gates
- Can dial out to Cell Phone
- Home Automation Integration

DOOR PHONE INTERCOM FOR ANY PABX

- Extension Connect
- Trunk Connect
- Can open Doors or Gates
- Video and Keypad options
- Touch tone dialing

CHOICE OF MULTIPLE INTERCOMS

- Marine Grade Stainless Steel
- Touch Switch Activation
- Flush and Surface Mount
- Video Camera options
- Keypad Entry options

MESSAGE ON HOLD FOR ANY PABX

- Digital Message On Hold
- MP3 files played from SD Card, USB stick or memory
- Automatic Message Updates by Internet or cellular network
- Optional After Hours Announcement

MESSAGE ON HOLD FOR SINGLE LINES

- Operates with standard phones
- Operates with cordless phones
- Optional Call Attendant facility
- Optional After Hours Announcement

BACKGROUND MUSIC AND MESSAGING

- Up to 4000 songs on SD Flash Card
- Intelligent Messaging or Music only
- Integrated Amplifier
- Instant Message on Demand

DIGITAL AUDIO FOR MESSAGING or PROMOTION

- Time and Date programmable Message play
- Switch, PIR or Timed Activation
- 1-12 separate inputs 1-12 separate outputs
- Powerful 8W amplifier

MODEM SWITCHES EFT-POS SWITCHES

- For Dial Out Modems
- For Dial In Modems
- Multiple Modem Switch
- Eftpos Switch
- Two Line Eftpos Switch

TELEPHONE LINE SWITCHES

- Privacy Switch
- Barge In Switch
- Multiple Number Switch
- Ring Delay Switch
- Two Line Switch
- Custom Solutions

CONTROL EQUIPMENT BY TELEPHONE LINE

- Switch Power ON or OFF Reset Power
- Touch Tone Controlled Relays
- PIN Security option
- Share your line with FaxStream Duet or Multiple Number services

CONTROL ACCESSORIES

- 240V Power Switches
- Normally ON or Normally OFF operation
- PC Reset unit
- Easy User Installation

CALL RECORDING FOR PABX OR SINGLE LINES

- Single Line Model
- PABX Handset Models
- PC based software
- Record and Playback
- Easy User Installation

PABX ACCESSORIES

- Paging Switches
- Automatic Call Attendant / Automatic Announcement Device
- Door Stations
- Message On Hold
- PABX Fax Switch

TELEPHONE LINE ACCESSORIES

- Ring Indicator
- Line In Use Indicator
- Ring Booster
- Telephone Call Transfer
- Telephone Line Monitor
- Telephone Auto Dialler

TELEPHONE LINE SIMULATORS

- Ideal for Test and Demo
- Australian Dial Tone and Ring
- CallerID output option
- International Models for 22 separate countries

30 day money back guarantee • designed and manufactured in australia • two year factory warranty

For a complete description of your solution, please call :

Manufactured in Australia

AUSTRALIA Phone (07) 5596 5128 Fax (07) 5596 5121 Email info@natcomm.com.au Web www.natcomm.com.au
NEW ZEALAND Phone (0800) NATCOMM or (0800) 628 2666 Email nz@natcomm.com.au Web www.natcomm.co.nz

Approved for Australia and New Zealand

Visit our comprehensive Web Site for information, brochures, prices, installation diagrams or to place an order.

EPSON
EXCEED YOUR VISION

PRECISIONCORE

Like a Laser. Only better.

- ✓ Up to 50% lower printing costs than colour laser
- ✓ Brilliant professional-quality colour
- ✓ Amazingly-fast printing
- ✓ Up to 70% less power than laser

www.BetterThanLaser.com.au